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Oceans and the law of the sea

Oceans and the law of the sea

Report of the Secretary-General**

Summary

The present report has been prepared in compliance with the request made by the General Assembly in paragraph 130 of its resolution 61/222 that the Secretary-General submit to the Assembly at its sixty-second session a comprehensive report on developments and issues relating to ocean affairs and the law of the sea. It is also submitted to States parties to the United Nations Convention on the Law of the Sea, pursuant to article 319 of the Convention, to be considered by the Meeting of States Parties under the agenda item entitled "Report of the Secretary-General under article 319 for the information of States parties on issues of a general nature, relevant to States parties, that have arisen with respect to the United Nations Convention on the Law of the Sea". It will furthermore serve as a basis for discussion at the eighth meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea and contains information on marine genetic resources, the topic chosen for that meeting. The report also provides information on the status of the Convention and its implementing Agreements, on declarations and statements made by States under articles 287, 298 and 310 of the Convention, State practice regarding maritime space, and developments within the bodies established by the Convention. Recent developments regarding international shipping activities, people at sea, maritime security, marine science and technology, conservation and management of marine living resources, marine biodiversity, protection and preservation of the marine environment, climate change, small island developing States, settlement of disputes, and international cooperation and coordination are also presented in the report, as well as information on the capacity-building activities of the Division for Ocean Affairs and the Law of the Sea.

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* A/62/50.

** Owing to the page limit, this report contains a mere summary of the most important recent developments and selected parts of contributions by relevant agencies, programmes and bodies.

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Abbreviations

ASEAN	Association of Southeast Asian Nations
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
GPA	Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
HELCOM	Baltic Marine Environment Protection Commission
HONLEA	Heads of National Drug Law Enforcement Agencies
ICS	International Chamber of Shipping
IFREMER	French Research Institute for Exploitation of the Sea
ILO	International Labour Organization
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission of UNESCO
ISPS	International Ship and Port Facility Security
IUCN	International Union for the Conservation of Nature and Natural Resources
MAP	Mediterranean Action Plan
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto
MEPC	IMO Marine Environment Protection Committee
MPA	Marine protected area
MSC	IMO Maritime Safety Committee
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PSSA	Particularly Sensitive Sea Area
RFMO	Regional fisheries management organization
SAR	International Convention on Maritime Search and Rescue
SOLAS	International Convention for the Safety of Life at Sea
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

UNEP/RSP	UNEP Regional Seas Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNU	United Nations University
WMO	World Meteorological Organization
WTO	World Trade Organization

I. Introduction

1. The present report is submitted in response to a request made by the General Assembly in part XVII of its resolution 61/222 on oceans and the law of the sea. The report reviews in a comprehensive manner the developments and issues relating to ocean affairs and the law of the sea. Since the General Assembly requested the eighth meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea (the "Consultative Process") to focus its discussions on the topic "Marine genetic resources", the report contains, in chapter X, an extensive review of this topic.

2. In accordance with paragraph 131 of resolution 61/222, contributions were received from various organizations and bodies of the United Nations system; however, owing to restrictions on length, only a portion of the submissions received have been reflected in the text. An addendum to the present report, which will be issued prior to the next session of the General Assembly, will contain additional information on some subjects which might not have been sufficiently addressed in the present report.

II. The United Nations Convention on the Law of the Sea and its implementing Agreements

A. Status of the Convention and its implementing Agreements

3. The number of parties to the United Nations Convention on the Law of the Sea (UNCLOS or "the Convention") increased, with the ratifications by Belarus on 30 August 2006 and Niue on 11 October 2006, the succession by Montenegro on 23 October 2006, and accession by Moldova on 6 February 2007. As at 28 February 2007, the number of parties to the Convention thus stood at 153, including the European Community. On the same respective dates, Belarus acceded to, and Montenegro succeeded to the Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea (the "Part XI Agreement"). Niue and Moldova expressed, on the respective dates, their consent to be bound by that Agreement as well. In this connection, it is recalled that, now any instrument of ratification or formal confirmation of or accession to the Convention represents such consent. Consequently, as at 28 February 2007, there were 127 parties to that Agreement, including the European Community. As at that date, the number of parties to the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (the "United Nations Fish Stocks Agreement") was 64, including the European Community, following the accessions by Trinidad and Tobago on 13 September 2006, Bulgaria on 13 December 2006, and Latvia on 6 February 2007, as well as the ratification by Niue on 11 October 2006.

B. Declarations and statements under articles 287, 298 and 310 of the Convention and article 43 of the 1995 Fish Stocks Agreement

4. On 25 August 2006, China made a declaration under article 298 of UNCLOS, stating that China does not accept any of the procedures provided for in section 2 of part XV of UNCLOS with respect to all the categories of disputes referred to in paragraph 1 (a), (b) and (c) of article 298. Belarus declared, upon ratification of UNCLOS and with reference to its article 287, that it accepts as the basic means for the settlement of disputes concerning the interpretation or application of the Convention an arbitral tribunal constituted in accordance with annex VII. Belarus also declared that for the settlement of disputes concerning fisheries, protection and preservation of the marine environment, marine scientific research or navigation, including pollution from vessels and by dumping, it would use a special arbitral tribunal constituted in accordance with annex VIII. It further recognized, with reference to article 292 of UNCLOS, the jurisdiction of the International Tribunal for the Law of the Sea over questions concerning the prompt release of detained vessels or their crews. Finally, Belarus declared that, in accordance with article 298 of UNCLOS, Belarus does not accept compulsory procedures entailing binding decisions for the consideration of disputes concerning military activities, including by Government vessels and aircraft engaged in non-commercial service, or disputes concerning law enforcement activities in regard to the exercise of sovereign rights or jurisdiction, or disputes in respect of which the Security Council of the United Nations is exercising the functions assigned to it by the Charter of the United Nations.

5. In its declaration made upon succession in respect to UNCLOS, Montenegro confirmed that, proceeding from the right that States parties have on the basis of article 310 of UNCLOS, Montenegro considers that a coastal State may, by its laws and regulations, subject the passage of foreign warships to the requirement of previous notification to the respective coastal State and limit the number of ships simultaneously passing, on the basis of the international customary law and in compliance with the right of innocent passage (arts. 17-32 of the Convention). Montenegro also considers that it may, on the basis of article 38, paragraph 1, and article 45, paragraph 1 (a) of the Convention, determine by its laws and regulations which of the straits used for international navigation in its territorial sea will retain the regime of innocent passage, as appropriate. Montenegro further considers that, owing to the fact that the provisions of UNCLOS relating to the contiguous zone (art. 33) do not provide rules on the delimitation of the contiguous zone between States with opposite or adjacent coasts, the principles of the customary international law, codified in article 24, paragraph 3, of the Convention on the Territorial Sea and the Contiguous Zone, signed in Geneva on 29 April 1958,[1] will apply to the delimitation of the contiguous zone between the parties to UNCLOS.

6. In its declaration upon accession to UNCLOS, Moldova affirmed, as a country without seashore,

> "the necessity to develop international cooperation for the exploitation of the living resources of the economic zones, on the basis of just and equitable

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[1] United Nations, *Treaty Series*, vol. 516, p. 205.

agreements that should ensure the access of the countries from this category to the fishing resources in the economic zones of other regions or sub regions".[2]

7. Upon its accession to the United Nations Fish Stocks Agreement, Bulgaria declared that the declarations made by the European Community upon ratification of that Agreement with regard to the transfer of competence by the Member States to the European Community in respect of certain matters governed by the Agreement, shall be also applicable to Bulgaria as from the date of its accession to the European Union.

III. Maritime space

A. Overview of recent developments regarding State practice, maritime claims and the delimitation of maritime zones

8. *Atlantic Ocean.* By a note verbale dated 25 August 2006, addressed to the Secretary-General, Ireland transmitted a copy of its Sea-Fisheries and Maritime Jurisdiction Act 2006, of 4 April 2006 (see *Law of the Sea Bulletin* No. 62).

9. *Mediterranean Sea.* In a note verbale dated 19 October 2006, addressed to the Secretary-General of the United Nations, Cyprus reacted to the note verbale, dated 4 October 2005, from the Permanent Mission of Turkey to the United Nations addressed to the Secretary-General of the United Nations, concerning the Statement of Position by the Republic of Cyprus on Turkey's objection to the Agreement between the Republic of Cyprus and the Arab Republic of Egypt, which had been published in the *Law of the Sea Bulletin* No. 59, page 34 (ibid.).

10. *North Sea.* The Netherlands transmitted through a note verbale, dated 14 November 2006, the Kingdom Act establishing a contiguous zone for the "Kingdom of 28 April 2005 (Contiguous Zone (Establishment) Act)", together with the "Decree of 14 June 2006 (Contiguous Zone (Outer Limits) Decree)" (ibid.).

11. *South Pacific.* The Pacific Islands Applied Geoscience Commission informed the Secretariat that, currently, there are 45 shared 200-nautical-mile exclusive economic zone boundaries in the region, out of which only 14 have actually been negotiated and/or ratified. The Commission is working with the States involved to make progress in these maritime boundary delimitations as a matter of urgency.

B. Deposit and due publicity

12. On 25 August 2006, Ireland deposited with the Secretary-General, in accordance with article 75, paragraph 2, of UNCLOS, a list of geographical coordinates of points, in World Geodetic System 84, specifying the outer limits of the exclusive economic zone of Ireland (ibid.).

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[2] See "Multilateral Treaties Deposited with the Secretary-General", at http://untreaty.un.org/ENGLISH/bible/englishinternetbible/partI/chapterXXI/treaty6.asp.

IV. Bodies established by the United Nations Convention on the Law of the Sea

A. International Seabed Authority

13. The twelfth session of the Assembly of the Authority was held in Kingston, from 7 to 18 August 2006. At that session, the Assembly of the Authority approved the budget of the Authority for the period 2007-2008, as recommended by the Finance Committee. The scale of assessment for 2007 and 2008 was to be based on the scale of assessment of the regular budget of the United Nations for 2006 and 2007 respectively, with a ceiling of 22 per cent and a floor of 0.01 per cent. The Assembly also approved a draft resolution[3] for the establishment of a special account known as the Endowment Fund for Marine Scientific Research in the Area. The initial capital of the Fund will consist of the balance as on 18 August 2006, from the application fees paid by the former registered pioneer investors together with interest accrued thereon. With regard to this Endowment Fund, a comprehensive set of rules and procedures are to be prepared for the consideration of the Council at its thirteenth session.

14. The Assembly elected 17 States to the 36-member Council, who shall serve a four-year term beginning 1 January 2007, in accordance with the understanding reached in the regional and interest groups as well as the understanding on relinquishment of seats, so that at any given time there are only 36 voting members. The Assembly also elected the new 15-member Finance Committee. In accordance with section 9, paragraph 4 of the annex to the Part XI Agreement, the members of the Finance Committee shall hold office for a term of five years and are eligible for re-election for "a further term". Following an extensive exchange of views, the Assembly proceeded to the election of all 15 nominees, on an exceptional basis, with the understanding that the election of the two nominees (from France and Italy) for a third term is a one-time decision that will not constitute a precedent for future elections, and that for future elections States parties shall indicate their candidates at least two months before the beginning of the session. The term of office for the newly elected Finance Committee is from 1 January 2007 to 31 December 2011.

15. In parallel with the session of the Assembly, the Council also held its session. The Council resumed its consideration of the draft regulations for prospecting and exploration for polymetallic sulphides and cobalt-rich ferromanganese crusts in the Area. The Council decided that the draft should be revised, and two separate regulations — one dealing with polymetallic sulphides and the other dealing with cobalt-rich ferromanganese crusts should be drafted. Priority was to be given to the drafting of the regulations on polymetallic sulphides, and presented to the Council at its thirteenth session.

16. The Council elected new members of the Legal and Technical Commission for the term of office 1 January 2007 to 31 December 2011. While the Convention provides for a 15-member Commission, there has been an increase in the number by a decision of the Council, since the first election of the Commission in 1996. At the present session, there were 25 nominations, and after prolonged discussions all 25 were elected to serve the next Commission, without prejudice to future elections.

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[3] See ISBA/12/A/7-ISBA/12/C/9, annex II, available at www.isa.org.jm.

The Council also requested the Secretary-General of the Authority to prepare a report on considerations relating to the future size and composition of the Commission. That report will be presented to the Council at its next session in 2007.

17. The Authority also held two workshops in 2006. The first workshop was held in Kingston from 27 to 31 March 2006 on cobalt-rich ferromanganese crusts deposits in the Area, and the diversity and distribution patterns of seamount fauna. The second workshop was on technical and economic considerations for mining cobalt-rich ferromanganese crusts and polymetallic sulphide deposits of the International Seabed Area, and was held at Kingston from 31 July to 4 August 2006. The proceedings of these workshops will be published by the Authority.[4]

18. The thirteenth session of the Authority is scheduled to be held from 9 to 20 July 2007 in Kingston.

B. International Tribunal for the Law of the Sea

19. The Tribunal held its twenty-first session from 6 to 17 March 2006 and its twenty-second session from 18 to 29 September 2006. The two sessions were devoted essentially to legal matters having a bearing on the judicial work of the Tribunal and other organizational and administrative matters. In particular, the Tribunal considered draft guidelines regarding the posting of a bond or other financial security with the Tribunal in prompt release proceedings as well as questions regarding its competence in maritime delimitation cases. In order to provide advocates, counsel and government legal advisers with practical information about proceedings before the Tribunal, it published in June 2006 *A Guide to Proceedings before the International Tribunal for the Law of the Sea*.[5]

20. A series of events were held to celebrate the tenth anniversary of the Tribunal. On 29 September 2006, a formal ceremony was held at the premises of the Tribunal, which was attended by representatives of the Federal Government of Germany and of the Senate of the Free and Hanseatic City of Hamburg, legal advisers, members of the Diplomatic and Consular Corps, representatives of the United Nations and international courts, academics and practitioners working in the field of the law of the sea. The ceremony was followed by a symposium on "The Jurisprudence of the Tribunal: Assessment and Prospects", organized by the International Foundation for the Law of the Sea.

21. At the invitation of the Government of the Republic of Senegal and in cooperation with the Korea International Cooperation Agency and the International Foundation for the Law of the Sea, the Tribunal held its first regional workshop in Dakar, from 31 October to 2 November 2006, to provide Government experts working in the field of the law of the sea with insight into the procedures for the settlement of disputes contained in part XV of the Convention. The workshop was attended by representatives of different ministries of 13 West African States, who discussed the topic of "The role of the International Tribunal for the Law of the Sea in the settlement of disputes relating to the law of the sea in West Africa". Two regional workshops will be held, in Jamaica and Singapore, in 2007.

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[4] See www.isa.org.jm.

[5] Available at www.itlos.org.

22. On 19 September 2006, the Tribunal re-elected Mr. Philippe Gautier (Belgium), Registrar of the Tribunal for a term of five years. On 26 September 2006, the Tribunal reconstituted the Chamber of Summary Procedure with the same composition as for the period 2005-2006. The Tribunal also extended until 30 September 2007 the terms of office of the members of the committees who had been elected to serve for the period ending 30 September 2006.

C. Commission on the Limits of the Continental Shelf

23. The Commission on the Limits of the Continental Shelf held its eighteenth session at United Nations Headquarters from 21 August to 15 September 2006.[6] The first plenary part of the session was held on 21 and 22 August, and the second plenary part was held from 6 to 8 September 2006. The periods from 23 August to 5 September and 11 to 15 September 2006 were used for the technical examination of submissions at the Geographic Information System laboratories and other technical facilities of the Division for Ocean Affairs and the Law of the Sea (the "Division") (see CLCS/48 and Corr.1, para. 64, and General Assembly resolution 60/30, para. 34). At this session the Commission continued the examination of the submissions made by Brazil, Australia, and Ireland. In addition, the Commission also took up for consideration, two new submissions, namely, that of New Zealand and the joint submission made by France, Ireland, Spain and the United Kingdom of Great Britain and Northern Ireland.

1. Consideration of the submission made by Brazil

24. During the eighteenth session of the Commission, the Chairman of the Subcommission established to examine the submission by Brazil reported on the work done by the Subcommission during the period following the seventeenth session of the Commission. He recalled that the delegation of Brazil had made a commitment to provide responses to issues raised by the Subcommission (see CLCS/50, paras. 14 and 15) no later than 31 July 2006, as well as to provide new seismic and bathymetric data. He stated that such information had been provided to the Subcommission on 26 July 2006 and that the members had continued their work, which included the analysis of the additional information, in the intersessional period prior to the eighteenth session.

25. Reporting on the work of the Subcommission during the period from 23 August to 5 September 2006, the Chairman stated that the Subcommission had evaluated the intersessional work and continued its consideration of the submission and the additional information. He further informed the Commission that, in response to the request by the delegation of Brazil, three meetings between the Subcommission and the Brazilian delegation had been held on 24, 25 and 29 August 2006. During these meetings, the delegation made several presentations and provided further clarifications concerning the additional information transmitted by Brazil in July 2006 regarding its submission. The Subcommission then continued its work and proceeded to draft the recommendations.

26. Work on the recommendations continued after the conclusion of the eighteenth session of the Commission with a view to their finalization in time for their

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[6] See CLCS/52 for more details on the eighteenth session.

consideration during the plenary part of the nineteenth session. The Subcommission is scheduled to meet for one week prior to that plenary part, namely from 19 to 23 March 2007.

2. Consideration of the submission made by Australia

27. During the eighteenth session, the Subcommission presented its preliminary views to the Australian delegation in respect of the ninth region in the submission.[7] The Subcommission and the delegation held three meetings in which considerations and responses were presented. The Subcommission will now meet for two weeks, from 5 to 16 March 2007 in the Geographic Information System laboratories at the Division in New York, with a view to finalizing the recommendations to be submitted to the Commission at the plenary of the nineteenth session.

3. Consideration of the submission made by Ireland

28. During the first plenary part of the eighteenth session, the Chairman of the Subcommission established to examine the submission made by Ireland reported on the work carried out by the Subcommission in the course of the intersessional period and on the plan of work for the eighteenth session. During the second plenary part of the eighteenth session, he introduced the recommendations of the Commission in regard to the partial submission made by Ireland on 25 May 2005 on the proposed outer limit of its continental shelf beyond 200 nautical miles in the area abutting the Porcupine Abyssal Plain, prepared by the Subcommission.

29. Following the presentation, the Chairman and the members of the Subcommission answered questions posed by members of the Commission and provided clarifications on certain aspects of the recommendations. Further consideration of the recommendations was deferred by the Commission to the nineteenth session.

4. Consideration of the submission made by New Zealand

30. The presentation on the submission of New Zealand was made on 21 August 2006, during the first part of the plenary, by Mr. Gerard van Bohemen, International Legal Adviser, Director, Legal Division, Ministry of Foreign Affairs and Trade. Following the presentation, members of the delegation of New Zealand responded to questions posed by the members of the Commission. The Commission then continued the meeting in private and decided that, as provided for in article 5 of annex II to the Convention and in rule 42 of the rules of procedure of the Commission (CLCS/40), the submission of New Zealand would be addressed through the establishment of a subcommission. The Commission established the Subcommission to examine the submission of New Zealand, composed of the following members: Alexandre Tagore Medeiros de Albuquerque, Harald Brekke, Peter F. Croker, Fernando Manuel Maia Pimentel, Kensaku Tamaki, Naresh Kumar Thakur and Yao Ubuènalè Woeledji. The Subcommission elected Mr. Brekke as its Chairman and Mr. Albuquerque and Mr. Tamaki as Vice-Chairmen.

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[7] During the seventeenth session of the Commission held in April 2006, the Subcommission presented its preliminary views on eight of the nine Australian regions under consideration by the Subcommission.

31. During the second plenary period, the Chairman of the Subcommission informed the Commission of the preliminary examination of the submission and the data accompanying it. The Subcommission had two meetings with the delegation of New Zealand to ask questions and receive further clarifications. The Chairman reported that the Subcommission would continue the consideration of the submission after the eighteenth session and decided to resume its meetings from 13 to 17 November 2006.

32. At its resumed session held in New York from 12 to 16 November 2006, the Subcommission continued its examination of the submission and reported progress on the Eastern and Southern regions of the submission. The Subcommission will share its preliminary findings and the progress made with the delegation of New Zealand during the nineteenth session and will continue the examination of the submission in the Geographic Information System laboratories from 19 to 23 March and 9 to 13 April 2007.

5. Consideration of the submission made by France, Ireland, Spain and the United Kingdom of Great Britain and Northern Ireland

33. The Heads of the four delegations, Elie Jarmache, Director of International Relations and Cooperation at the General Secretariat of Oceans (France); Lisa Walshe, Law of the Sea Director at the Department of Foreign Affairs (Ireland); Sergio Carranza Forster, Area Chief at the Ministry of External Affairs and Cooperation (Spain); Lindsay Parson, Leader of the United Nations Convention on the Law of the Sea Group of the National Oceanography Centre (United Kingdom) made a presentation of the submission made jointly by their Governments to the Commission. This submission covers a portion only of the outer limits of the extended continental shelf appurtenant to all four coastal States. In particular, the Commission was informed that this area was not subject to any dispute between the four States making the submission and any other State. Following the presentation, the representatives of the four delegations responded to questions posed by the members of the Commission.

34. The Commission addressed the modalities for the consideration of the submission and decided that, as provided for in article 5 of annex II to the Convention and in rule 42 of the rules of procedure of the Commission, the joint submission would be addressed by way of a subcommission, which was established with the following membership: Lawrence Folajimi Awosika, Noel Newton St. Claver Francis, Mihai Silviu German, Abu Bakar Jaafar, Yuri Borisovitch Kazmin, Wenzheng Lu and Philip Alexander Symonds. The Subcommission thus established elected Mr. Jaafar as its Chairman and Mr. Francis and Mr. Symonds as Vice-Chairmen.

35. At the end of the session, the Chairman of the Subcommission reported to the Commission that the Subcommission had proceeded with its preliminary examination of the submission and the data accompanying it, and that it had met three times with the delegations of the four coastal States to raise questions and receive further clarifications.

36. On the basis of that examination, the Subcommission decided to hold a resumed eighteenth session from 22 January to 2 February 2007 at United Nations Headquarters.

37. At the resumed eighteenth session, the Subcommission continued its examination of the joint submission and held four meetings with the four delegations during which it posed additional questions and received answers and clarifications in writing as well as additional material.

6. New submissions

38. On 27 November 2006, Norway made its submission to the Commission through the Secretary-General. In accordance with rule 50 of the rules of procedure of the Commission, the Secretary-General circulated a Continental Shelf Notification, concerning the executive summary of the submission and all charts and coordinates indicating the proposed outer limits of the continental shelf and the relevant territorial sea baselines, to all States Members of the United Nations, including the States parties to the Convention. The executive summary of the submission was also made available on the website of the Commission, which is maintained by the Division.[8] The examination of this submission was included in the provisional agenda of the nineteenth session of the Commission.

7. Report of the Chairman of the Commission on the sixteenth Meeting of States Parties

39. The Chairman informed the members of the Commission on the proceedings of the sixteenth Meeting of States Parties related to the work of the Commission and the proposal presented by the Commission to the Meeting. He also drew the attention of the members of the Commission to the decision on issues related to the proposals by the Commission (SPLOS/144) and to paragraphs 65 to 82 of the report of the sixteenth Meeting of States Parties, which dealt with information on the activities of the CLCS (SPLOS/148).

40. The Commission took note of the information and also of operative paragraph 4 of the above-mentioned decision, in which the Meeting of States Parties called upon the CLCS to further consider, in consultation with the Secretariat, possible ways of improving its working methods in order to ensure the timely and efficient performance of its functions, and invited the Chairman of the Commission to inform the next Meeting of States Parties on measures taken in that respect.

41. The Commission deliberated on the matter, with reference, inter alia, to paragraph 71 of the report of the sixteenth Meeting of States Parties, containing a list of suggested options, other than financing the Commission from the regular budget of the United Nations that the Meeting suggested as worth exploring. The members of the Commission noted that a number of those options had already been discussed within the Commission, and that some of them had been implemented, for example, the use of advanced secure means of communication for intersessional work. It was pointed out, however, that the most productive interaction and work took place during the sessions of the Commission and in the meetings of the subcommissions. In the light of that fact, the Commission then focused its attention on options that were related to the length and frequency of sessions and meetings, scheduling/queuing of the consideration of submissions and the possibility of setting time limits for the consideration of individual submissions.

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[8] See http://www.un.org/Depts/los/clcs_new/clcs_home.htm.

42. Considering the difficulties experienced in handling five submissions simultaneously during the eighteenth session, the Commission decided that in view of the increasing number of submissions and in order to organize its work in the most efficient way, the following rules will apply to the submissions received after the end of the eighteenth session of the Commission: (1) only three subcommissions shall function simultaneously while considering submissions; (2) the submissions shall be queued in the order they are received; (3) the submission next in line shall be taken for consideration by a subcommission only after one of the three working subcommissions presents its recommendations to the Commission.

43. It was agreed that the above decision represented a temporary and partial measure, and was subject to review if circumstances, including the availability of additional funding and related resources in order to increase the length and frequency of sessions, so warranted. The decision and associated matters, such as the possibility of setting time limits with respect to consideration of submissions, will be included in the provisional agenda of the nineteenth session. It was also agreed that the amended rules of procedure which will be finalized at the nineteenth session will reflect the agreed changes.

8. Future sessions of the Commission

44. The Commission decided to resume its eighteenth session from 13 to 17 November 2006 and from 22 January to 2 February 2007. The Commission also decided that, in the light of the current workload, the nineteenth session would be held from 5 March to 13 April 2007. The decision was taken on the understanding that the technical examination of submissions would take place at the Geographic Information System laboratories and other technical facilities of the Division prior to and following the plenary meetings of the Commission, which would be held from 26 March to 5 April 2007. The meetings of the twentieth session would be held from 20 August to 7 September 2007 on the understanding that the technical examination of submissions would take place at the Geographic Information System laboratories and other technical facilities of the Division prior to and following the plenary meetings of the Commission, which would be held from 27 to 31 August 2007. In preparation for the programme budget proposal for the biennium 2008-2009, the Commission indicated that in both 2008 and 2009 two sessions should be convened annually: the first in March-April, the second in August-September. Each session would involve two weeks of plenary meetings with full conference services and four weeks of meetings of the subcommissions at the Geographic Information System laboratories and other technical facilities of the Division (i.e., each session should be convened for a total of six weeks). In addition, up to three resumed sessions of two weeks each should be convened annually by the Commission in between the main sessions for subcommission work.

V. Developments relating to international shipping activities

A. Economic aspects of shipping

45. Shipping plays a key role in world trade. In 2005, world seaborne trade (goods loaded) continued to grow by 3.8 per cent, reaching 7.11 billion tons of goods. There was also a 7.2 per cent increase in the world merchant fleet, the highest

increase since 1989, owing to an increase in new building deliveries, although tonnage broken up and lost had decreased. Furthermore, the average age of the world fleet dropped marginally to 12.2 years. However, 27.1 per cent of the fleet is at least 20 years old. The share of the world fleet registered in developing countries continued to increase at a rate of 7.9 per cent, predominantly as a result of investments made by shipowners in Asian developing countries, accounting for 78.6 per cent of the developing countries' total fleet. The tonnage registered in developed market-economy countries grew at a rate of 6.9 per cent, and their nationals continued to own two thirds of the tonnage registered in major open-registry countries. Thus, beneficial ownership remained concentrated in 10 major shipowning countries.[9]

B. Safety of navigation

46. Of vital importance for efficient shipping and global seaborne trade are safely constructed and regularly surveyed ships; a well-trained crew with labour conditions that meet the global standard (see sect. VI.A below); properly stowed cargo; safe, secure and crime-free routes for navigation (see also sect. VII below), and effective implementation of international rules and standards. These aspects of safety of navigation have been regulated over time by relevant international organizations. Recent developments regarding some of these aspects are presented below.

1. Safety of passenger ships

47. According to the amendments to the International Convention for the Safety of Life at Sea (SOLAS) adopted by the International Maritime Organization (IMO) for passenger ships, including large cruise ships, future passenger ships will have to be designed for improved survivability so that, in the event of a casualty, persons can stay safely on board as the ship proceeds to port. The amendments incorporate criteria for the "casualty threshold", that is, the amount of damage a ship is able to withstand, according to the design basis, and still safely return to port. They are expected to enter into force on 1 July 2010. IMO also adopted new fire regulations for cabin balconies on passenger vessels, which are expected to enter into force on 1 July 2008.[10]

2. Transport of dangerous goods

48. In its resolution 61/222, the General Assembly reiterated paragraphs 45 and 46 of resolution 60/30 relating to the maritime transport of radioactive materials (see A/61/63, paras. 61-62 and 68). Likewise part B of resolution GC(50)/RES/10 relating to transport safety, adopted on 22 September 2006 by the International Atomic Energy Agency (IAEA) General Conference, is very similar to its 2005 resolution on the same subject. In its 2006 resolution, the Conference again noted the progress in the implementation of the Action Plan on the Safety of Transport of Radioactive Materials. It also welcomed the informal discussions on communication

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[9] United Nations Conference on Trade and Development, *Review of Maritime Transport 2006* (United Nations publication, Sales No. E.06.II.D.7), pp. 1, 20 and 26; A/61/160, annex, para. 27; and the contribution of UNCTAD to the present report.

[10] See resolution MSC.216 (82) adopted at the eighty-second session of the Maritime Safety Committee (MSC), 29 November to 8 December 2006, in MSC 82/24/Add.1, annex 24.

in relation to the safe transport of radioactive materials, which took place in July 2005 and September 2006 between shipping States and relevant coastal States with IAEA involvement and noted the intention of those States to continue the discussions. The Conference looked forward to progress towards addressing and understanding concerns of coastal and shipping States and expressed the hope that "further enhancements to mutual confidence, particularly through voluntary communication practices, with due regard to particular circumstances, will result".[11]

49. At the regional level, some coastal States continue to express their concerns regarding the potential for damage in the event of an accident or incident during transportation of radioactive materials by sea, including pollution of the marine environment. The Caribbean Community continues to express serious concerns regarding shipments of high level radioactive waste through the Caribbean.[12] In October 2006, Pacific Islands Forum members reiterated their concerns about the risks of economic loss in an incident involving the shipment of radioactive materials through the Pacific and restated their views that in the event of losses directly attributable to such an incident, it was imperative for the shipping States not to leave the countries suffering those losses unsupported.[13]

3. Hydrographic surveying and nautical charting

50. Revised performance standards for Electronic Chart Display and Information Systems were adopted by IMO and are aimed at improving the operational reliability of such equipment taking into account technological progress and recent experience gained.[14] Newly constructed high-speed craft will be required to carry the system commencing in 2008 and all other high speed craft will have to comply by 2010.[15] There are ongoing discussions to extend this requirement to other forms of international shipping. The mandatory carriage of the system requires the ready availability of electronic nautical charts and coastal States are called on to meet their obligations under SOLAS to provide up-to-date nautical information. The International Hydrographic Organization is continuing to undertake measures to address these issues including the intensification of efforts to build capacity to improve hydrographic services and the production of nautical charts. It has received a substantial funding commitment from the Republic of Korea in this regard. Throughout 2006, the International Hydrographic Organization Capacity-Building Programme undertook technical assessment visits, and conducted a number of seminars and courses on marine safety information, multibeam sonar, practical hydrography and electronic nautical chart production.

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[11] Available at http://www.iaea.org.

[12] Communiqué issued by the Conference of Heads of Government of the Caribbean Community at the conclusion of the seventeenth intersessional meeting of the Conference, 9-10 February 2006, Port of Spain; and statement issued by the Chairman of the Caribbean Community on the planned shipment of high-level radioactive waste from France through the Panama Canal via the Caribbean Sea, News Release 54/2006, 14 March 2006, available at www.caricom.org.

[13] Communiqué of the thirty-seventh Pacific Islands Forum, Fiji, 24-25 October 2006, A/61/558, annex.

[14] Resolution MSC.232(82) of 5 December 2006, in MSC 82/24/Add.2.

[15] At its eighty-second session, MSC approved this requirement for the mandatory carriage of the Electronic Chart Display and Information Systems.

51. IMO approved additional guidance on chart data and the accuracy of positions on paper charts, and thus raster navigational charts, where there is no determined datum or the datum is imprecise (see SN.1/Circ.255).

52. The coastal States of the Western Indian Ocean have signed the necessary agreements for the Western Indian Ocean Marine Highway Development Project, which is funded by the World Bank, to proceed (see also para. 55 below).

4. Routes used for international navigation

53. Critical for the safety of navigation and life at sea and the protection and preservation of the marine environment are safe and secure routes for navigation and the availability of accurate and adequate hydrographic survey coverage and up-to-date nautical information. In congested shipping areas, or areas with obstructions to navigation, limited depths or unfavourable meteorological conditions, or in environmentally sensitive sea areas, aids to navigation, ship routing measures, ship reporting systems and vessel traffic services can aid safety of navigation. Pilots can further assist in ensuring the vessel's safe passage (see para. 282 below).

54. *Ship routing measures and reporting systems*. IMO adopted three new and amended five existing traffic separation schemes, including the associated routing measures. It also adopted a mandatory no-anchoring area for the approaches to the Gulf of Venice, Italy; a new precautionary area off the west coast of the North Island of New Zealand; a new recommended route in the Minches, United Kingdom; and also amended three existing measures in the United Kingdom. Apart from the new ship reporting system for the Galapagos (ibid.), IMO also adopted amendments to the existing mandatory system in the Storebælt (Great Belt) Traffic Area and in the Gulf of Finland. All measures adopted by IMO will take effect on 1 July 2007.[16]

55. *Straits used for international navigation*. Given their strategic importance for international shipping, the attention of the international community has continued to focus on safety of navigation and security in the Straits of Malacca and Singapore (see also para. 79 below). In its resolution 61/222, the General Assembly repeated its call in resolution 60/30 for user States and States bordering straits used for international navigation to cooperate by agreement on matters relating to navigational safety, including safety aids for navigation, and the prevention, reduction and control of pollution from ships, thus echoing the provisions of article 43 of UNCLOS. The Assembly, referring to the Jakarta and Kuala Lumpur Statements on Enhancement of Safety, Security and Environmental Protection in the Straits of Malacca and Singapore (see A/60/529, annex II, and A/61/584, annex, respectively) welcomed the progress made in establishing a cooperative mechanism on safety of navigation and environmental protection to promote dialogue and facilitate close cooperation between the littoral States, user States, shipping industry and other stakeholders and in implementing the Marine Electronic Highway Demonstration Project in the Straits of Malacca and Singapore.

56. In the Kuala Lumpur Statement,[17] the participants agreed that the work of the Tripartite Technical Experts Group on Safety of Navigation should continue to be

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[16] All measures were adopted by MSC at its eighty-second session. See COLREG.2/Circ.58 and Corr.1, SN.1/Circ.257 and SN.1/Circ.258 and Corr.1, available at www.imo.org.

[17] Adopted at the Kuala Lumpur Meeting on Enhancement of Safety, Security and Environmental Protection in the Straits of Malacca and Singapore on 20 September 2006.

supported; as well as the proposed cooperative mechanism presented by the littoral States to promote dialogue and facilitate close cooperation between the littoral States, user States, the shipping industry and other stakeholders. The Meeting furthermore expressed support for six projects[18] that had been identified by the littoral States for enhancing safety of navigation and environmental protection and agreed that the littoral States, user States, the shipping industry and other stakeholders should cooperate towards the establishment of a mechanism for voluntary funding for the projects and the maintenance and renewal of the aids to navigation in the Straits.

C. Implementation and enforcement

1. Flag State implementation

57. The exercise of effective control by flag States over ships flying their flag is very important to ensure the implementation and enforcement of the relevant provisions of UNCLOS as well as of other conventions. In its report (A/61/160, annex), the Ad Hoc Consultative Meeting of senior representatives of international organizations on the "genuine link"[19] underlined the need for ongoing compliance with international regulations wherever a ship is operating, irrespective of registry or flag, and the importance of developing a "compliance culture". The Meeting also suggested, for example, that a joint model course on flag State implementation covering all flag State responsibilities falling within the mandates of the various agencies, might be useful (ibid., paras. 12 and 53).

58. The IMO Council considered the report of the Meeting a comprehensive and useful tool that may be used to highlight the obligations of flag States under UNCLOS. As regards possible measures to counteract non-compliance, the Council noted that suspension of registration could be counterproductive and lead to re-registration with countries not properly fulfilling the "genuine link" requirements in UNCLOS (ibid., p. 2).

59. The General Assembly, in its resolution 61/222, took note of the report of the Ad Hoc Consultative Meeting. The Assembly also welcomed the Voluntary IMO Member State Audit Scheme, which enables flag States to assess how effectively they implement and enforce relevant IMO convention standards, and encouraged all flag States to volunteer to be audited.[20] As of October 2006, 24 States had volunteered. Four audits were commenced in 2006, the first one in September.[21]

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[18] See IMO/KUL 1/3. The projects relate to the following: removal of wrecks in the traffic separation schemes in the Straits; cooperation and capacity-building on hazardous and noxious substance preparedness and response; demonstration project of class B automatic identification system transponders on small ships; setting up tide, current and wind measurement systems; and replacement and maintenance of aids to navigation in the Straits.

[19] The Meeting was convened by IMO in July 2005, in response to the invitation extended to IMO and other relevant competent international organizations in General Assembly resolutions 58/240 and 58/14, to examine and clarify the role of the "genuine link" in relation to the duty of flag States to exercise effective control over ships flying their flag, including fishing vessels, and the potential consequences of non-compliance with duties and obligations of flag States described in relevant international instruments.

[20] The IMO Council had also encouraged Member States that had not yet volunteered for audits, to do so and also to continue to nominate as many qualified auditors as possible.

[21] See C 97/WP.2, para. 7, and contribution of IMO to the present report.

According to a flag State performance table compiled by the shipping industry, 18 flag States do not meet all the required criteria, for example, they are frequently detained, are not party to important IMO and International Labour Organization (ILO) instruments and are not listed on the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers "White List".[22] The United Nations Conference on Trade and Development (UNCTAD) secretariat has identified efforts to prevent the operation of substandard ships as an area where close intergovernmental and inter-agency cooperation continues to be appropriate.[23]

2. Port State control

60. Port State control has steadily expanded over the years and constitutes an important mechanism for the enforcement of relevant conventions. It complements but does not replace flag State control. In light of the increase in port State control, IMO will start to develop a code of conduct for port State control activities.[24] In addition, in order to facilitate the eradication of substandard ships, while ensuring that the inspection results are recognized and accepted at the global level, IMO also decided to harmonize port State control activities at the global level through harmonization of the procedures, activities and practices of the port State control regimes.[25]

61. Furthermore, the States participating in the memorandums of understanding on port State control continue to coordinate their port State control activities. For example, joint concentrated inspection campaigns are taking place which increase the efficient use of resources and information. In 2006, such campaigns were held jointly by the Paris and Tokyo memorandums of understanding for MARPOL annex I inspections and resulted in 96 detentions out of 4,824 inspections.[26] Further campaigns are scheduled in 2007 on the International Safety Management Code and in 2008 on safety of navigation (SOLAS chap. V).[27] The Black Sea and Mediterranean memorandums of understanding also decided to conduct joint concentrated inspection campaigns starting in 2007 on the International Safety Management Code.[28]

D. Wreck removal

62. The draft convention on the removal of wrecks[29] will be considered at a diplomatic conference, to be held from 14 to 18 May 2007 at the United Nations Office in Nairobi. Once adopted, it will provide the legal basis for States to remove,

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[22] See Shipping Industry Flag State Performance Table. 2006 Update, available at www.marisec.org.

[23] Contribution of UNCTAD to the present report.

[24] MSC 82/24, para. 10.11.

[25] Ibid., paras. 10.13-10.14.

[26] See Tokyo memorandum of understanding secretariat press release, 19 July 2006, available at www.tokyo-mou.org.

[27] The campaign in 2007 is to be undertaken jointly by the Paris Memorandum Of Understanding, Tokyo Memorandum Of Understanding and the United States Coast Guard. See Tokyo memorandum of understanding secretariat press release, 26 September 2006.

[28] Declaration of the first joint working session of the Committees of Black Sea and Mediterranean Memoranda of Understanding on Port State Control. MSC 82/23/2.

[29] The text of the draft convention is contained in LEG/CONF.16/3.

or have removed, from their exclusive economic zones, wrecks that may pose hazards to navigation or, because of the nature of their cargo, to the marine environment, or to both. Shipowners will be required to take out insurance to cover the costs of removal and provide States with a right of direct action against insurers.[30] The draft convention provides for the application, mutatis mutandis, of part XV of UNCLOS relating to the settlement of disputes if no settlement is possible within 12 months.

63. One outstanding issue that the Diplomatic Conference will need to decide is whether the scope of the new convention should be extended to the territorial sea. During the ninety-second session of the IMO Legal Committee, some delegations underlined that since problems related to wreck removal were mostly encountered in the territorial sea, States parties should benefit from the mandatory international insurance provisions of the convention with regard to claims concerning wreck removal in that zone. They proposed two options: (1) to amend the current definition of "convention area"; or (2) include an opt-in provision in a new article which would allow any State Party to extend the scope of the provisions of the convention to its territorial sea. Several delegations, including industry representatives, supported either the first or second option. A slight majority favoured restricting the scope of the convention to the exclusive economic zone, contending, inter alia, that a compulsory extension to the territorial sea would require coastal States to consult on removal of wrecks, which is contrary to the sovereign rights of the coastal State under UNCLOS. Some of these delegations stated, however, that they could support option 2. Two proposals have been developed for option 2, but the Legal Committee could not reach agreement. Negotiations will continue among interested delegations before the Diplomatic Conference.[31]

64. The General Assembly in its resolution 61/222 noted the work of IMO with regard to the preparation of the draft convention on removal of wrecks, and also requested States to take appropriate measures with regard to ships flying their flag or of their registry which may pose a hazard to navigation or the marine environment.

VI. People at sea

65. The need to ensure the safety of life of people at sea, whether they are seafarers, fishers or people who use the maritime route to cross international borders clandestinely, has been raised in several forums over the past few years and several instruments have been adopted in response. What is required now is for this body of law to receive widespread acceptance by States and be effectively implemented.

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[30] Contribution by IMO to the present report.

[31] See the submission by Norway, Italy and Denmark in LEG 92/4/3; the submission by Argentina in LEG 92/4/5 and the report of the ninety-second session of the Legal Committee in LEG 92/13. The two proposals are contained in annexes 2 and 3.

A. Seafarers and fishers

66. Past reports have highlighted some of the problems faced by seafarers, including prolonged detention following a maritime accident and abandonment in foreign ports. The Database on Abandonment of Seafarers,[32] set up in 2005 and operated by ILO, contains 40 reported cases of abandonment that occurred between January 2004 and November 2006. While 22 cases were resolved, including those involving the crew of three fishing vessels, during the latter half of 2006, none of the reported cases was resolved. Thus, the Secretary-General of the International Maritime Organization and the Director-General of the International Labour Organization sent letters to the flag States concerned, requesting their assistance in the resolution of those cases. Overall, the problem of abandonment of crew has underlined the need for longer-term solutions to address the problems of liability as well as financial security with regard to compensation in cases of abandonment, death or personal injury of seafarers.[33]

67. The ILO is implementing a five-year action plan to achieve rapid and widespread ratification and effective implementation of the Maritime Labour Convention. The goal is to have sufficient registered ratifications within five years to bring the Convention into force.[34] IMO will amend the International Safety Management Code and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers in order to promote safe behaviour on board ships and also align those instruments more closely with the Maritime Labour Convention. It has been emphasized by some States that seafarers should be considered an essential and integral part of the safety culture and empowered to provide input into the safety management systems onboard a ship.[35]

68. Workers in the fishing sector are not protected by the Maritime Labour Convention although working on board fishing vessels is widely recognized as a hazardous occupation (see A/56/58, paras. 126-131) thus requiring regulation to ensure decent working conditions. The International Labour Conference in 2005 had considered for adoption, the draft convention concerning work in the fishing sector. It failed to be adopted at that time, however, owing to the lack of sufficient support given the large number of abstentions. Despite this, the Conference underlined the importance of adopting a convention and thus will reconsider in 2007, the adoption of a convention supplemented by a recommendation.[36]

69. The proposed convention is a consolidation of existing ILO conventions on the fishing sector and is comprehensive in nature. It aims to ensure decent working conditions for all fishers, including independent fishers who are paid on the basis of a share of the catch and therefore considered self-employed workers. The goal is to reflect the changes over the last 40 years, in particular, concerning safety, health, social security, as well as changes in compliance and enforcement in order to provide for port State control. The proposed text of the 2005 draft convention was regarded by many Government representatives, however, as being over-prescriptive,

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[32] See http://www.ilo.org/dyn/seafarers/seafarersbrowse.home.

[33] LEG 92/13, sect. 5.

[34] Contribution of ILO to the present report.

[35] MSC 82/24, paras. 21.23-21.25 and 21.60.

[36] International Labour Organization, *Provisional Record*, International Labour Conference, 93rd Session, No. 25, Geneva, 2005. An Interregional Tripartite Round Table was convened in Geneva from 11-13 December 2006 to pursue this goal.

insufficiently flexible and tailored for workers in developed States. In addition, it was underlined that to reach the greater portion of the world's fishers, the convention required widespread ratification and to achieve this, further work on the text of the convention was necessary.[37]

B. International migration of people by sea

70. During 2006, an unprecedented number of people used the maritime route to cross international borders clandestinely. For example, more than 23,000 people arrived on the coast of Yemen from Somalia, with a considerable number having international protection needs.[38] Approximately 35,481 people — triple the number since 2005 — entered Spain, especially via the Canaries, during the first 10 months.[39] Reports indicate that the number of stowaways also more than tripled compared to 2005, with 244 incidents involving 667 stowaways.[40]

71. While it is impossible to know the exact number, many people are assumed to have died at sea, owing to the indifference, if not the design, of the smugglers.[41] For example, it is estimated that only two thirds of the 300,000 sub-Saharan Africans who attempt every year to reach the European Union by sea via its closest entry points succeed.[42]

72. Whatever mode of maritime transport is chosen, it is likely to be equally perilous, thus underlining the importance of rescue at sea. In its resolution 61/222, the General Assembly called upon States to ensure that masters on ships flying their flag take the steps required by SOLAS, the International Convention on Maritime Search and Rescue (SAR Convention), UNCLOS and the International Convention on Salvage to provide assistance to persons in distress at sea and urged States to cooperate to take all necessary measures to ensure the effective implementation of the amendments to the SAR Convention and SOLAS (see A/59/62, Add.1, paras. 75-76). Guidance on the relevant legal provisions, on practical procedures to ensure the prompt disembarkation of survivors of rescue operations, and measures to meet their specific needs, particularly in the case of refugees and asylum-seekers, has been provided in an IMO/UNHCR leaflet.[43]

73. In its resolution 61/222, the General Assembly also called upon States that had not done so to become parties to and effectively implement the Protocol against the Smuggling of Migrants by Land, Sea and Air, supplementing the United Nations

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[37] Ibid., No. 24, Geneva, 2005.

[38] "Yemen: More deaths in Gulf of Aden". *UNHCR Briefing Notes*, 15 December 2006, available at www.unhcr.org; and contribution of UNHCR to the present report.

[39] "Illegal migrants entering Spain by sea said to have tripled". *ABC* website, Madrid, 8 November 2006.

[40] Reports on stowaway incidents submitted to IMO in 2006. FAL.2/Circ.102 at www.imo.org.

[41] For example, people are sometimes thrown overboard by the smugglers. Op. cit., note 38; UNHCR News Stories, 7 September 2006.

[42] *Organized Crime and Irregular Migration from Africa to Europe*. Document prepared by the Regional Office of West and Central Africa and the Research and Analysis Section of the United Nations Office on Drugs and Crime, and issued in July 2006, available at www.unodc.org.

[43] "A guide to principles and practice as applied to migrants and refugees". Leaflet prepared by IMO and UNHCR. The text is available at www.imo.org and at www.unhcr.org. UNHCR also produced "Selected Reference Materials: Rescue at Sea, Maritime Interception and Stowaways", available at www.unhcr.org.

Convention against Transnational Organized Crime and the Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children. The United Nations Office on Drugs and Crime has noted that despite the wide adherence to the smuggling Protocol (as of 1 February 2007 there were 105 parties), its implementation at the national level is largely absent or inadequate. It has designed a three-track programme to prevent and combat smuggling of migrants from Africa to Europe. The first track addresses the development of legislation for countries of origin and transit. Funding is being mobilized for the programme to be launched in 2007.[44]

74. Cyprus, France, Greece, Italy, Malta, Portugal, Slovenia and Spain consider irregular migration in the Mediterranean a problem that needs to be addressed at the European level, particularly in terms of financial aid and the deployment of resources. They consider it crucial to strengthen operational cooperation in the management of the European Union's southern sea border, through sea patrols, rescue and the identification of irregular migrants.[45] Spain has been negotiating agreements with several African countries to seek their assistance in combating illegal migration in exchange for development aid.[46]

75. The African Union has recommended, for example, the development of regional countermeasures that, inter alia, also encourage more legal channels and orderly migration; dismantle international organized criminal syndicates; prosecute those involved in the smuggling, while at the same time providing humane treatment for migrants; and provide for joint cross-border patrols between neighbouring States.[47]

76. At the High-level Dialogue on International Migration and Development at the General Assembly in September 2006, participants affirmed that international migration was a growing phenomenon, both in scope and complexity, affecting virtually all countries in the world. There was general consensus that trafficking in persons and the smuggling of migrants should be combated with urgency at the national, bilateral, regional and global levels. Although effective border control was considered necessary by many participants, it was recognized that security and control measures alone would not eliminate irregular migration. Participants also underscored that measures to control irregular migration should not prevent persons fleeing persecution and other vulnerable populations from seeking international protection (see A/61/515). The General Assembly has, inter alia, requested States to adopt concrete measures to prevent the violation of human rights of migrants while in transit, including in ports and at borders (see General Assembly resolution 61/165 on the protection of migrants).

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[44] Contribution from the United Nations Office on Drugs and Crime to the present report and "Organized Crime and Irregular Migration from Africa to Europe", op. cit., note 42.

[45] Joint letter, dated 25 September 2006, addressed to the European Union presidency, from the heads of State of Cyprus, France, Greece, Italy, Malta, Portugal, Slovenia and Spain. "Eight southern European countries call for EU action on migration". *Agence France-Press news agency*, Paris, 25 September 2006.

[46] "Spain will 'not tolerate' mass African migration — deputy premier". Radio Nacional de España Radio 1, Madrid, 4 September 2006.

[47] The Migration Policy Framework for Africa adopted by the Executive Council of the African Union at its ninth ordinary session, held in Banjul, the Gambia, 25 to 29 July 2006, see A/61/345, annex I.

VII. Maritime security

77. There is an increasing awareness of the many challenges to maritime security, their interconnectivity and the multiple effects they can have across a spectrum of disciplines. Cooperation at all levels is therefore vital to effectively prevent and combat threats to maritime security. At the national level, where the responsibility for various aspects of maritime security rests with different departments and agencies, it will be important to establish an effective decision-making structure and agreed procedures for inter-agency coordination in order to make maximum use of the available resources to conduct maritime surveillance, reporting and interdiction, and also enable effective cooperation with other States. It will equally be important to effectively coordinate activities at the bilateral and multilateral levels, in particular as regards procedures for information-sharing and operational coordination. In its resolution 61/222, the General Assembly encouraged States to cooperate to address threats to maritime security through bilateral and multilateral instruments and mechanisms aimed at monitoring, preventing and responding to such threats.

78. The importance of strengthening bilateral and multilateral cooperation has also been emphasized in several other forums. It has been raised, for example, in the Association of Southeast Asian Nations (ASEAN),[48] and at the Gulf of Guinea Maritime Safety and Security Ministerial Conference, which resulted in the adoption of an action plan. Moreover, the resolution adopted at the IMO/Maritime Organization of West and Central Africa forum on the establishment of an integrated coastguard function network for West and Central African Countries,[49] inter alia, called for the establishment of a regional integrated coastguard function network for West and Central Africa across a wide range of activities.[50] The Caribbean Community has also agreed to put in place expeditiously regional management systems in relation to border control, maritime operations and intelligence and information-sharing.[12]

79. Other States have also intensified their cooperation on security issues at the multilateral and bilateral levels (see also paras. 88 and 89 below). For example, the efforts of the States bordering the Straits of Malacca in enhancing security in the Straits through coordinated patrols were commended at the Kuala Lumpur Meeting (see also paras. 55 and 88). The improvements in security measures have resulted in the removal by the Lloyd's insurance market of the Straits from its list of areas deemed high security threats to shipping.

80. In addition to these developments, efforts of States have also focused on strengthening cooperation in response to specific threats. Some of these initiatives are presented below, while smuggling of people by sea is addressed in section VI.B above.

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[48] See, for example, the Chairman's Statement of the Thirteenth ASEAN Regional Forum, Kuala Lumpur, Malaysia, 28 July 2006; the Joint Statement of the ASEAN-China Summit, Nanning, China, 30 October 2006; and the statement by the Foreign Secretary of the Philippines, Mr. Alberto G. Romulo, on 12 January 2007 regarding the ASEAN-Japan Second Counter-Terrorism Dialogue to be held in 2007 and which will also deal with maritime security issues.

[49] The Forum was held from 23 to 25 October 2006 in Dakar, Senegal. See MSC 82/24, paras. 17.19-17.23.

[50] "Framework for Action Plan adopted at Ministerial Conference". Press release by the Commander, Navy Region Europe, 15 November 2006, available at www.cnrc.navy.mil.

A. Terrorist acts against shipping and offshore installations

81. Any measures taken to prevent terrorist acts against shipping, offshore installations and other maritime interests must be in conformity with international law, including UNCLOS. In its resolution 61/222, the General Assembly invited States to become parties to the 2005 Protocols to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation and the Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms Located on the Continental Shelf. The ASEAN Convention on Counter-Terrorism, adopted on 13 January 2007, has incorporated by reference the 2005 Protocols' definition of an "offence".

82. The General Assembly also called upon States to effectively implement the International Ship and Port Facility Security (ISPS) Code. Effective implementation has also been underlined by the Group of Eight as important for securing the world's critical energy infrastructure.[51] An ISPS survey conducted by the International Chamber of Shipping (ICS) between October 2005 and March 2006 indicated that 73 per cent of the ships trading at port facilities worldwide encountered no problems as a result of implementation of the Code. The problems encountered by the remaining 27 per cent related in particular to enforcement in port facilities and the identification and behaviour of officials, as well as that of stevedores.[52] A report on the results of a government and port-industry survey conducted by the UNCTAD Secretariat, focusing particularly on the costs associated with the implementation of and compliance with the ISPS Code, is under preparation.[53]

83. As a supplement to its Guidance on voluntary-self assessment by Administrations and for ship security (MSC.1/Circ.1193 of 30 May 2006), IMO developed a voluntary standard checklist which companies and company security officers can use in order to assess, document and improve the effectiveness with which they are fulfilling the obligations in SOLAS, chapter XI-2 and the ISPS Code.[54]

84. Increasing attention has also been given to ensuring the security of those ships and other craft, port facilities,[55] as well as fixed and floating offshore installations that are not covered by SOLAS, chapter XI-2 and the ISPS Code. Since those ships share the same operational environment as ships which fall within the scope of SOLAS and the ISPS Code and since their operations can affect the security of the latter, IMO will develop for those ships, categorized as posing a threat,

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[51] Statement on Global Energy Security at the Group of Eight Summit, St. Petersburg, 16 July 2006.

[52] Submission by ICS to MSC. MSC 81/5/15.

[53] UNCTAD *Transport Newsletter No. 33*, Third Quarter 2006, pp. 5-6; and contribution of UNCTAD to the present report.

[54] Interim Guidance on voluntary self-assessment by companies and company security officers (CSOs) for ship security. MSC.1/Circ.1217.

[55] The security provisions of SOLAS and the ISPS Code do not generally apply to cargo ships, including high-speed craft, of less than 500 gross tonnage; nor to ships not propelled by mechanical means; wooden ships of primitive build; pleasure craft not engaged in trade; fishing vessels; all types of ships not engaged on international voyages; and all port facilities serving the ships which do not fall within the scope of SOLAS and the ISPS Code.

recommendatory guidelines on possible measures to enhance maritime security for use by Governments at their own discretion.[56]

85. As regards the protection of offshore installations, the General Assembly in its resolution 61/222 urged all States, in cooperation with IMO, to adopt measures related to the prevention, reporting and investigation of acts of violence against installations, in accordance with international law, and to implement such measures through national legislation to ensure proper and adequate enforcement.

B. Piracy and armed robbery against ships

86. The number of acts of piracy and armed robbery against ships reported to IMO in 2006 totalled 240, representing a decrease of 24 incidents compared to 2005. The areas affected were the South China Sea (71 incidents), the Indian Ocean (52), East Africa (32), West Africa (31), South America (26), the Malacca Straits (18), the Caribbean (6), the Arabian Sea (3) and the Mediterranean (1).[57] Most of the attacks took place or were attempted in territorial waters while ships were at anchor or berthed. Although the level of violence and the incidence of kidnapping have decreased, reports received by the International Maritime Bureau of the International Chamber of Commerce indicate that 188 crew members were nonetheless taken hostage, 77 kidnapped, 15 killed, and 15 injured.[58]

87. Thus IMO, while recognizing that the cooperative efforts by navies and coastguards have contributed to the overall decrease in the number of acts of piracy and armed robbery against ships has nonetheless emphasized that the incidence of such acts remained a cause of concern and much more needed to be done to reduce this threat. All Governments and industry have been urged to intensify and coordinate their efforts to eradicate these unlawful acts.[59]

88. The General Assembly in its resolution 61/222 again urged all States, in cooperation with IMO, to combat piracy and armed robbery at sea. It welcomed the progress that had been made in some regions in strengthening cooperation among States and highlighted in particular the Jakarta and Kuala Lumpur Statements (see also para. 55 above) and the entry into force of the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia on 4 September 2006, by which the Information Sharing Centre was officially launched and established as an international organization in Singapore on 29 November 2006.

89. Cooperation in combating acts of piracy and armed robbery against ships has also intensified in other regions (see para. 78 above). For example, Kenya, Mozambique, Somalia and the United Republic of Tanzania agreed to cooperate in pooling resources in communications, personnel and equipment to combat acts of

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[56] Report of the MSC on its eighty-second session. MSC 82/24, paras. 4.73-4.75.

[57] Piracy and armed robbery against ships. Quarterly and monthly reports. Note by the IMO Secretariat. MSC 82/17 and Corr.1, and MSC.4/Circ.94, 95 and 96.

[58] ICC International Maritime Bureau: Annual report of incidents of piracy and armed robbery against ships (1 January-31 December 2006).

[59] See MSC 82/24, sect. 17.

piracy and armed robbery against ships off the coast of Somalia, with the assistance of the development partners.[60]

C. Illicit traffic in narcotic drugs and psychotropic substances

90. Illicit traffic in narcotic drugs and psychotropic substances is a criminal activity that can cover a number of scenarios, for example, illegal activities of crew members on commercial vessels; the offload from mother ships to smaller coastal vessels; deep water drops of buoyed contraband that are recovered by shore-based craft; and the concealment of drugs within commercial sea-freight containers.[61] The modes of transport particularly favoured by syndicates are fishing vessels, pleasure craft and container vessels. Commercial sea freight containers continue to be a major transport medium. Fishing vessels provide a means of transport for delivery of illicit drugs and mother-ship offloads, as well as for offshore refuelling and provisioning for go-fast boats.[62]

91. In order to effectively respond to the threat posed by illicit traffic in narcotic drugs, the Heads of National Drug Law Enforcement Agencies (HONLEA) in Asia and the Pacific region, Latin America and the Caribbean region, Africa and Europe at their meetings held in 2005 and 2006 underlined, inter alia, the need for Governments to: (a) strengthen law enforcement cooperation at the national and international levels; (b) conduct joint maritime patrols with neighbouring or regional partners and joint training of law enforcement officers; (c) strengthen cooperation between border authorities both nationally and internationally in the exchange of information, for example, on vessel movements, consignments and intelligence; and (d) establish the legal and procedural framework to enable coordination among all relevant law enforcement agencies at the national level and thus support an effective coordinated inter-agency response. It was pointed out that the establishment of a specialized maritime response capacity; the conclusion of national coordination agreements between drug law enforcement agencies and the military authorities; and the holding of regular meetings between services and combined agency training, had proven successful strategies. The need for capacity-building was underlined by HONLEA in Africa. Insufficient law enforcement capacity and porous borders had made countries in the West African region particularly vulnerable.[63]

92. Underlining the importance of effective control measures at ports that handle sea containers, HONLEA concluded that it was important to encourage and support cooperative partnerships between drug law enforcement agencies and the commercial sector; to develop harmonized risk indicators based on, for example, the

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[60] Joint communiqué by the delegations of the Governments of Kenya, Mozambique, the United Republic of Tanzania, and the Transitional Federal Government of Somalia, issued at the end of the regional meeting, Mombasa, Kenya, 23-24 February 2006, see http://www.mfa.go.ke.

[61] Observations of participants at the Thirteenth Meeting of HONLEA, Asia and the Pacific, held in Bangkok, Thailand, from 14 to 17 November 2006, communicated in the contribution of the United Nations Office on Drugs and Crime to the present report.

[62] Ibid., Sixteenth Meeting of HONLEA, Latin America and the Caribbean, Buenos Aires, Argentina, 23 to 27 October 2006, communicated in the contribution of the United Nations Office on Drugs and Crime to the present report.

[63] Ibid., Fifteenth and Sixteenth Meetings of HONLEA, Africa, held in Ouagadougou, 29 March-1 April 2005, and Nairobi, 25-29 September 2006, respectively.

origin of shipment, transport risk area, type of goods, etc.; and to establish multiagency drug law enforcement interdiction teams at container ports and terminals. In this regard, it can be noted that the United Nations Office on Drugs and Crime Container Control Pilot Programme[64] aims to assist Governments, initially Ecuador and Senegal, followed by Ghana and Pakistan, to establish effective container controls that will serve not only to prevent illicit traffic in narcotic drugs and other illicit activity, but also to facilitate legitimate trade and raise State revenues. Joint port control units, comprising customs and enforcement officers, are being created at selected locations and staff trained and equipped to identify and inspect high-risk freight containers with minimum disruption to legitimate trade and business. Project ideas have also been developed for a container control programme in East Africa and South Africa.

VIII. Marine science and technology

A. Ocean observing programmes

93. *Global Ocean Observing System.* The Intergovernmental Oceanographic Commission (IOC) has continued the development of the Global Ocean Observing System. Much of the implementation of the Observing System takes place through the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology. The second session of the Joint Commission in 2005 set a workplan for operational oceanography and marine meteorology for the next four years 2005-2009. In executing the plan, in 2006 the global drifting buoy array reached its design goal of 1,250 buoys in sustained service, thus being the first component of the Observing System to be completed. In addition, more than 2,700 Argo profiling floats have been deployed since initiation of the project in 2001 and a substantial number of sea level stations upgraded to real time data delivery in support of tsunami warning systems.[65] The IOC International Oceanographic Data and Information Exchange has recently been tasked by the IOC Assembly[66] to directly support the development of the System and the international scientific programmes of IOC and WMO by providing advice and ocean data management services.

94. The global module of the Global Ocean Observing System is at the same time the ocean component of the Global Climate Observing System, which serves the sustained observing needs of the United Nations Framework Convention on Climate Change. This module is designed to improve weather and climate forecasting, monitoring and research, as well as serve as the foundation for global operational oceanography. The Global Ocean Observing System incorporates existing operational elements, and is expanding by developing pre-operational pilot projects to demonstrate utility and cost-effectiveness; building capacity for developing countries; stimulating and enabling research; and interacting with users to determine the most useful products.[66] The Global Ocean Observing System Scientific Steering Committee will meet in June 2007 to examine activities related to the Global

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[64] For further details on the Programme, see www.unodc.org/unodc/en/law_enforcement.html.

[65] For additional details on these programmes, see A/60/63/Add.2, para. 90.

[66] See revised objectives of the International Oceanographic Data and Information Exchange, as adopted by the IOC Assembly at its twenty-third session, in resolution XXIII-4 and contained in document IOC-XXIII/3.

System; the implementation of the coastal module of the System; and the coordinated implementation of operational elements of the System.[67]

95. *Operational oceanography and the IOC Advisory Body of Experts on Oceans and the Law of the Sea.* Since 2004, the Advisory Body has been invited by the IOC Assembly to address the legal regime within UNCLOS that is applicable to the collection of oceanographic data "operational oceanography". It is generally agreed that acquiring widespread and increased knowledge and data about oceans and sea that may assist in understanding oceanic and climatic processes and in predicting and mitigating natural disasters, through operational oceanography, is of benefit to mankind. A lack of legal clarity creates uncertainty which may result in human losses and be very costly in economic terms. Thus the Advisory Body has been examining how to define operational oceanography in view of the rapid development of technologies used for ocean observing programmes (see sect. VIII.C below); and how to develop practical guidelines based on the relevant provisions of UNCLOS provisions related to marine scientific research with a view to facilitating and promoting operational oceanography.

96. The General Assembly, in its resolution A/61/222, noted the work of the Advisory Body on this issue and its efforts to develop a consensual text on the legal framework for the collection of oceanographic data within the context of the Convention. The seventh session of the Advisory Body is scheduled to be held in Libreville, from 19 to 23 March 2007.

B. Early warning systems

97. Since July 2006, the Indian Ocean Tsunami Warning and Mitigation System is equipped with networks of detection composed of 28 tide gauges broadcasting data in real time, 26 seismic stations and four deep ocean pressure sensors.[68] The Warning System, which is coordinated by an IOC Intergovernmental Coordination Group (see A/60/63/Add.2, para. 101), is presently being set up with a network of 28 national tsunami centres, which are responsible for issuing warnings in their territories, communicating with the local authorities, the media and the population at risk. However, 20 of the participating countries have yet to develop national plans for tsunami early warning and response systems. These systems are needed for an effective national infrastructure. In order to assist member States of the Intergovernmental Coordination Group/Indian Ocean Tsunami Warning and Mitigation System[69] in the implementation of end-to-end tsunami warning systems at the national level, the Global Consortium on Tsunami Recovery[70] was established and is coordinated by the International Strategy for Disaster Reduction secretariat through its Platform for the Promotion of Early Warning, in close cooperation with

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[67] See annotated provisional agenda of the meeting, document IOC-WMO-UNEP-ICSU/GSSC-X/1.1(2).

[68] Contribution from UNESCO/IOC to the present report.

[69] See IOC Assembly resolution XXIII-12 on the establishment and terms of reference of the Warning and Mitigation System available at: http://ioc3.unesco.org/indotsunami/IOC23/resolution12.htm.

[70] Members are: IOC, WMO, the Office for the Coordination of Humanitarian Affairs, the World Bank, UNDP, UNEP, the International Federation of Red Cross and Red Crescent Societies and the International Strategy for Disaster Reduction secretariat.

UNESCO/IOC. Operational leadership will be provided by the International Strategy for Disaster Reduction system partners at the country level.

98. In addition to the Indian Ocean effort, IOC coordinates and supports the establishment of tsunami early warning systems for the Mediterranean, North-eastern Atlantic and adjacent seas[71] and for the Caribbean. IOC also continues with updating the System in the Pacific Ocean (ibid., para. 102) and preparations for a coordination mechanism on the global scale.

C. Recent developments in marine technology

99. Continued improvements in oceanographic knowledge are essential to the proper management of ocean space. Previous reports have dealt with methodologies and advances in ocean instrumentation, investigations and data acquisition projects (see, for example, A/60/63/Add.1, paras. 45-51 and 58-97), and the information presented below supplements those reports.

100. The Japan Agency for Marine-Earth Science and Technology's deep riser-drilling research vessel *D/V Chikyu* is now operational and has successfully undergone its shakedown cruise off the Shimokita Peninsula. It is scheduled to start operations as the flagship of the Integrated Ocean Drilling Project in September 2007. The *D/V Chikyu* has now sailed to the coast of eastern Africa where it will undertake a commercial oil drilling job. This unusual use of a research ship will allow the Agency to meet rising operating costs while still training the crew and gaining drilling experience in various geologic environments.[72] With the commissioning of the riser-drilling vessel *D/V Chikyu* the long-standing goal of drilling through the Mohorovičić Discontinuity is feasible, although it will not happen before 2010.[73]

101. The usage of autonomous underwater vehicles termed "gliders" is an expanding trend in ocean research programmes within countries such as Australia, China, France, Japan, the Russian Federation, the United Kingdom and the United States of America. These self-propelled, low energy consuming instrument platforms are capable of long-term independent data gathering missions, and the goal is to develop an efficient, relocatable, infrastructure-free ocean observing system composed of high-endurance, low-cost gliding vehicles with near-global range and modular sensor payload. Many gliders have adaptive sampling strategies and the automated control of large glider fleets operating within the framework of an autonomous oceanographic sampling network allows for the investigation of temporal and spatial scales inaccessible with traditional methods.

102. The Ocean Tracking Network, a proposed $168 million project, has received an initial $35 million from Canada to use computer tags implanted in fish, mammals

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[71] For recent developments in this regard related to an Italian initiative, see press release from the United Nations News service: "UN-backed tsunami warning system for Europe could protect millions of people", 13 February 2007, available at www.un.org/apps/news; and also "Breakthrough at Bonn meeting for the provision of continuous seismic coverage to detect tsunamis in Europe" at http://portal.unesco.org.

[72] Mervis, Jeffrey, Ocean Drilling: Higher Costs, Accident Imperial Plans, *Science* 27 October 2006: Vol. 314, No. 5799, p. 577, available at www.sciencemag.org.

[73] "*Mission Moho*: Formation and Evolution of Oceanic Lithosphere", Integrated Ocean Drilling Program, in *Eos*, Vol. 87, No. 48, 28 November 2006, available at www.iodp.org.

and even crabs in conjunction with lines of inexpensive subsea receivers in all the world's oceans to monitor marine life and ocean conditions. The Network is a part of the 10-year long Census of Marine Life. The system will function via a number of means including an extensive array of seafloor acoustic receivers, satellite receivers and by the electronic tags intra-communicating. The receivers will report information on the location of the animals and local marine conditions including water temperature, salinity and light conditions that the animal encounters. The Network has undergone pilot deployment off British Columbia as the Pacific Ocean Shelf Tracking Project,[74] where researchers tracked salmon stocks, and the data they collect are being used in quota assessments. The Network will be expanded, and is planned to have 5,000 sensors spanning 14 ocean regions covering the entire planet and tracking up to a million animals.[75] The project is projected to include some 60 research institutions worldwide as well as international organizations such as IOC.

IX. Conservation and management of fishery resources

A. State of marine fishery resources

103. In a recent report on world fisheries, the Food and Agriculture Organization of the United Nations (FAO) indicated that, of 441 stock or species groups for which information assessment is available: (a) about 3 per cent is underexploited and 20 per cent is moderately exploited; (b) an estimated 52 per cent is fully exploited, and are therefore producing catches that are already at or very close to their maximum sustainable production limit, with no room for further expansion, and even some risk of decline if not properly managed; (c) 17 per cent is overexploited; (d) 7 per cent is depleted; and (e) 1 per cent is recovering.[76] FAO noted also that, from 1974 to the present, there has been a downward trend in the proportion of underexploited and moderately exploited stocks, while at the same time, there has been an increasing trend in the proportion of overexploited, depleted and recovering stocks, which altogether have increased from around 10 per cent in the mid-1970s to an estimated 24 per cent in 2002.[76]

104. This state of marine seas capture fisheries is believed to result from a combination of factors which have adversely affected the productivity of fish stocks. These include overcapacity and overfishing, illegal, unreported and unregulated fishing (IUU fishing), unreliable fisheries data and statistics, harmful subsidies and unsustainable fishing practices, including the use of non-selective fishing gear that generates excessive by-catch of juvenile fish, dependent and associated species, and unregulated bottom fishing activities in deep-sea areas where there are sensitive habitats and vulnerable marine ecosystems.

105. With particular reference to areas under national jurisdiction where approximately 85 per cent of global fish catches occur, overfishing, conflicts between coastal and industrial fisheries, IUU fishing by foreign fishing vessels, gear conflicts in coastal areas, use of destructive fishing practices by local fishers, and conflicts between the fisheries sector and other sectors operating within the coastal

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[74] www.postcoml.org/outreach/events.htm.

[75] www.oceantrackingnetwork.org and www.oceanconserve.org.

[76] FAO Fisheries Technical Paper 457, *Review of the state of world marine fishery resources* (FAO, Rome, 2005), p. 6.

area, have contributed to depletion of fishery resources and degradation of vulnerable marine habitats.

106. The situation is cause for concern. It begs the question as to whether the provisions of relevant international fishery instruments such as the United Nations Fish Stocks Agreement and the FAO Code of Conduct for Responsible Fisheries were being implemented or the recommendations of various international conferences over the past few years inviting States to implement new tools to fisheries management, such as the precautionary approach and an ecosystem approach, fisheries management plans, and precautionary reference points, have been applied effectively with view to achieving sustainable fisheries.

107. In 2006, the General Assembly, in its annual review of the state of marine capture fisheries (resolution 61/105), expressed again its concern over the state of marine fisheries and reaffirmed, inter alia, the importance it attached to the long-term conservation, management and sustainable use of marine living resources of the world's oceans and seas as well as the obligations of States to cooperate to this end, in accordance with international law, as reflected in the relevant provisions of UNCLOS and the Agreement. The Assembly recommended also to States to implement a set of measures to achieve this objective.

B. Recent initiatives to improve fisheries governance

108. Emphasis has been put in recent years on strengthening the mandate of existing regional fisheries management organizations or arrangements and in establishing new modernized ones with the capacity to respond to current challenges. Efforts have also been initiated to improve flag State implementation, in recognition of the primary role of the flag State to enforce international conservation and management measures over vessels flying its flag on the high seas.[77] Moreover, port State control has been developed as complementary jurisdiction for ensuring compliance with regional fisheries management organizations and arrangements conservation and management measures.[78]

109. *Implementation of flag State responsibilities.* The duties of the flag States over vessels flying its flag on the high seas are contained in the relevant provisions of the FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas and the United Nations Fish Stocks Agreement.[79] In addition, the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing has developed a comprehensive toolbox which further elaborates on measures to be taken by the flag State to fulfil its responsibilities, to assist them in addressing illegal, unreported and unregulated fishing.[80]

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[77] General Assembly resolutions 58/14, paras. 22 and 40; 59/25, paras. 30, 53 and 55; 60/31, paras. 37, 38, 57, 58 and 60; 61/105, paras. 34, 41, 66 and 73.

[78] General Assembly resolutions 58/14, paras. 23 and 29; 59/25, paras. 31 and 38; 60/31, paras. 36 and 42; 61/105, para. 70; and Report of the Review Conference on the United Nations Fish Stocks Agreement (A/CONF.210/2006/15), annex, para. 32.

[79] FAO Compliance Agreement, art. III; United Nations Fish Stocks Agreement, arts. 18 and 19.

[80] International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, paras. 34-50, available at www.FAO.org.

110. At its sixty-first session, the General Assembly in its resolution 61/105 on sustainable fisheries, urged States, individually and collectively through regional fisheries management organizations and arrangements, to cooperate to clarify the role of the "genuine link" in relation to the duty of States to exercise effective control over fishing vessels flying their flag and to develop appropriate processes to assess the performance of flag States with respect to implementing the obligations regarding fishing vessels flying their flag set out in relevant international instruments. FAO has recently published a legal paper entitled "The 'genuine link' concept in responsible fisheries: legal aspects and recent developments".[81]

111. *Implementation of port State measures*. The United Nations Fish Stocks Agreement provides the legal framework for the implementation of port State measures for ensuring compliance with international conservation and management measures (art. 23). A Model Scheme on Port State Measures was endorsed by the twenty-sixth session of the FAO Committee on Fisheries in 2005. The Model Scheme provides guidelines on the principles that form the basis of port State competence; on modalities of inspections and actions that it has to take following inspection of foreign fishing vessels.[82] An early operationalization of the Scheme, which provides implementation of article 23 of the United Nations Fish Stocks Agreement would contribute towards the fight against illegal, unreported and unregulated fishing.

112. *Strengthening of existing regional fisheries management organizations and arrangements*. Regional fisheries management organizations and arrangements have been requested to undergo performance reviews, either by themselves or with the assistance of external partners, using transparent criteria, to assess the adequacy of their overall management against the benchmark provided in the United Nations Fish Stocks Agreement and other relevant instruments, including best practices of regional fisheries management organizations,[83] and to make their findings publicly available.[84] Some regional organizations such as the North East Atlantic Fisheries Commission and the Northwest Atlantic Fisheries Organization indicated that they had completed such reviews and had brought consequential amendments to their respective conventions.[85] Other regional fisheries management organizations and arrangements are expected to undertake such reviews in the future.

113. *Establishment of new regional fisheries management organizations and arrangements*. Since the adoption of the United Nations Fish Stocks Agreement in 1995, a number of regional fisheries management organizations and arrangements have been set up in various regions of the globe (South East Fisheries Organization,

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[81] A. D'Andrea. "The 'genuine link' concept in responsible fisheries: legal aspects and recent developments". *FAO Legal Papers Online* No. 61. 2006.

[82] FAO Fisheries Report No. 759: Report of the Technical Consultation to Review Port State Measures to Combat Illegal, Unreported and Unregulated Fishing, Rome, 31 August-2 September 2004, para. 25.

[83] See General Assembly resolution 61/105, para. 70; and A/CONF/210/2006/15, annex, para. 32 (j).

[84] See General Assembly resolutions 60/31, para. 60; 61/105, para. 73; and A/CONF/210/2006/15, annex, para. 32 (j); FAO Fisheries Report No. 780: Report of the Twenty-sixth Session of the Committee on Fisheries, paras. 111-112.

[85] See Performance Review Panel Report of the North East Atlantic Fisheries Commission, http://www.neafc.org; and Northwest Atlantic Fisheries Organization Annual Report 2006, http://www.nafo.int.

Western and Central Pacific Fisheries Commission and Southern Indian Ocean Fisheries Agreement). The objective is to cover all the world's oceans with regional fisheries management organizations and arrangements with the competence to manage high seas fishery resources, including bottom fisheries, with a view to avoiding situations where some high seas areas remain unregulated.

114. Negotiations were commenced in 2006 for the establishment of a regional fisheries management organization in the South Pacific, thanks to an initiative by Australia, Chile and New Zealand. The third round of the negotiations will be held in Chile, from 30 April to 4 May 2007. One of the major outcomes of the meeting is expected to be the adoption of interim measures to be implemented in the convention area prior to the entry into force of the future agreement.

C. Activities undertaken by competent international organizations

115. A number of international organizations have undertaken activities in their respective areas of competence to improve governance of marine capture fisheries, including through technical and financial assistance to developing countries. The following is an overview of some of the activities of international organizations, such as FAO, the United Nations Industrial Development Organization (UNIDO) and the Ramsar Convention secretariat to address some fisheries-related issues.

1. Activities of the Food and Agriculture Organization of the United Nations

116. *Bottom trawling*. FAO is finalizing for 2007 a report relating to the options to mitigate bottom habitat impact of dragged gears, owing to the fact that impact of bottom trawling on the benthic habitat varies considerably according to the gear used and the habitat in which it was deployed and in view of the fact that impacts in some habitats are poorly investigated.

117. *Reduction of by-catch*. Despite a significant reduction in the global discards of marine fisheries over the past decade, considerable by-catch problems exist in tropical shrimp trawl fisheries. In order to address this issue, a GEF-funded project was conducted by FAO in 11 countries where shrimp are commercially important. FAO conducted also national workshops on by-catch issue in Indonesia, Nigeria and the Philippines, in 2006. This includes a FAO technical assistance to Nigeria on environmental certification for product export to the United States market.

118. *Marine debris*. FAO has cooperated with UNEP to prepare a study on marine litter and abandoned/lost fishing gear in view of its adverse impacts on fish stocks and habitats. It concludes that derelict fishing gear remains a serious global problem causing significant ecological, biological, economic and amenity impacts, and recommended that in order to address the lack of scientific information on the issue, a close cooperation between all relevant organizations, States, fishing industry and non-governmental organizations be initiated. The study further suggested that a global response to marine debris should focus on the implementation of annex V of MARPOL rather than in the development of new regimes. An additional study by FAO on the environmental impact of lost and derelict fishing gears will be available in the course of 2007.

119. *Implementation of the 1993 Compliance Agreement*. FAO has continued to urge its Member States to become parties to the Compliance Agreement as a means

of enhancing the management of high seas fisheries and combating illegal, unreported and unregulated fishing.[86] The Agreement requires FAO to establish an international database of information on fishing vessels authorized by flag States to conduct fishing operations on the high seas. Several parties have already submitted such data to FAO for inclusion in the database.[87]

120. *Implementation of the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing*. One major aspect of FAO activities to combat illegal, unreported and unregulated fishing focuses on technical assistance to countries for the development of national plans of action. They are fundamental to the fight against illegal, unreported and unregulated fishing as they enable countries to have a set of coherent, consistent and coordinated measures that can be used against such fishing.[88] They also provide the basis for bilateral and regional cooperation on illegal, unreported and unregulated fishing, in recognition of the importance of this type of cooperation against this practice.

121. *Implementation of the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries*. Despite the adoption of mitigation measures in a number of countries, incidental catch of seabirds remain a subject of national and international concern. FAO completed in 2006 a report on a review and assessment of mitigation measures in longline and trawl fisheries, to assist in the implementation of the 1999 International Plan of Action. In addition, FAO has been cooperating with BirdLife International on a GEF Project Development Facility-B, which is a project that focuses on "best practice" guidelines for the development of national plans of action for seabirds.

122. *Implementation of the Strategy for Improving Information on Status and Trends of Capture Fisheries*. A project under the FAO Fish Code Programme was launched in 2004 to support the implementation of the Strategy. The project gives particular attention to capacity-building in developing countries and regional cooperation.

2. Activities of the United Nations Industrial Development Organization

123. UNIDO activities in the fishing sector include technical assistance to developing countries in reducing conflicts between industrial and artisanal fisheries, which have increased in several developing countries and led to depletion of fish stocks. While in developed countries elaborate systems exist to address competitive interactions between fleets and fleet sectors, such systems are less frequent in developing countries. Some extreme examples of negative interactions are found in the dominance of large, foreign-owned demersal trawlers over small-scale local fleets in the inshore areas of some West African States.

124. As a result, UNIDO is initiating cooperation with several relevant organizations[89] in formulating and implementing global project proposals to address this issue, consistent with the objectives of the Millennium Development Goals

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[86] As of 31 December 2006, 34 States and the European Community have accepted the Agreement.

[87] Belize, Benin, Canada, Ghana, Japan, Namibia, New Zealand, Norway, Syrian Arab Republic, United States and the European Community on behalf of its Member States.

[88] In June 2006 a workshop for South Asian countries was held to assist countries to elaborate national plans of action (FAO Fisheries Report No. 809). Technical assistance was also provided to several countries for the development and dissemination of national plans of action on IUU fishing.

[89] UNIDO in its contribution refers to GEF, FAO, UNEP, UNDP and WWF.

(Goals 7 and 8) and priorities defined in the World Summit on Sustainable Development. In addition, further action is required to build capacity in developing countries for establishing effective monitoring, control and surveillance systems to reduce conflicts between artisanal and industrial fisheries and for negotiating jointly access fisheries agreements with developed countries. A subregional and regional agreement on joint measures for the early recovery of marine living resources is also needed.

3. The Ramsar Convention on Wetlands

125. In view of the importance of coastal and marine wetlands for marine living resources and coastal communities, and in preparation of the World Wetlands Day 2007, the Convention secretariat, in cooperation with FAO and the Sea Around Us Project, has distributed a leaflet on fisheries and wetlands to all Member States and stakeholders around the world. The brochure highlights the important role that inland and coastal wetlands play in supporting fish and fisheries at all levels, the critical role that wetlands play as spawning and nursery areas for many marine species, as well as the urgent need for an effective management of fisheries and the wetland ecosystems that support them.

X. Marine genetic resources

A. Introduction

126. The marine environment covers a wide thermal range, the variability of which has facilitated extensive speciation at all phylogenetic levels, from micro-organisms to mammals, and includes many metabolites and other resources in living or dead form. As a result, oceans provide a large reservoir of unique organisms of interest to scientists and industry alike in their quest to improve our knowledge and understanding of the Earth's ecosystems and develop new products to cure diseases, create cleaner and cost-effective industrial processes and, more generally, improve human well-being.

127. As early as the mid-1960s, the toxinological aspects of sea anemones were being studied and their bioactive substances isolated.[90] Since the 1970s, many scientific reviews have covered the most important aspects of sponge organisms' chemistry and pharmacology.[91] Developments in molecular technology and

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[90] J. A. Westfall, "Nematocysts of the Sea Anemone Metridium", in *American Zoology*, Vol. 40 (1965); E. J. Martin, "Anticoagulant from the sea anemone Rhodactis howesii", in *Proceedings of the Society for Experimental and Biological Medicine*, vol. 121, No. 4 (1966); R. Blanquet, "Properties and composition of the nematocyst toxin of the sea anemone, Aiptasiapallida", in *Comparative Biochemistry and Physiology*, Vol. 25, No. 3 (1968).

[91] C. P. Li, A. Goldin, et al., "Antineoplastic substances from the sea: a review", in *Cancer Chemotherapy Reports*: Part 2, Vol. 4, No. 3 (1974); T. Natori, K. Akimoto, et al., "Development of KRN7000, derived from agelasphin produced by Okinawan sponge", in *Nippon Yakurigaku Zasshi*, Vol. 110, Suppl 1 (1997); S. Iwasaki, "Natural organic compounds that affect to microtubule functions", in *Yakugaku Zasshi*, Vol. 118, No. 4 (1998); G. M. Cragg and D. J. Newman, "Discovery and development of antineoplastic agents from natural sources", in *Cancer Investigation*, Vol. 17, No. 2 (1999); G. Schwartsmann, A. Brondani da Rocha, et al., "Marine organisms as a source of new anticancer agents", in *The Lancet Oncology*, Vol. 2, No. 4 (2001); P. Proksch, R. A. Edrada, et al., "Drugs from the seas — current status and

bioinformatics are facilitating gathering of information on the diversity of existing bacteria and their potential. So far, more than 15,000 molecules have been isolated and described from different marine sources including invertebrates, algae and marine microbes.[92] New technologies have also facilitated access to remote locations of the deep oceans. The number of novel compounds continues to grow as new discoveries are made in diverse marine ecosystems.

128. However, marine research, whether undertaken for taxonomic or commercial purposes, remains an expensive endeavour, in particular with regard to resources from extreme environments (see A/60/63/Add.1, para. 60). As a result, partnerships between public research institutions and biotechnology companies have been established. In many cases, such partnerships are the only avenue to increase our knowledge of the oceans since funding available for identifying new leads against long-lasting human diseases, for example, appears to be greater than that available for conducting taxonomic inventories of the oceans. Modern oceanography is therefore becoming more interdisciplinary.

129. In recent years, in the context of the discussions on the conservation and sustainable use of marine biodiversity, the search for and use of marine genetic resources has attracted increasing attention from academia and international forums (see A/59/62, A/59/122, A/60/63/Add.1, A/61/65 and SPLOS/148). The present chapter aims to facilitate the work of the Consultative Process at its eighth meeting by providing the necessary information base, with regard to the nature of marine genetic resources, their ecological and socio-economic benefits, the nature of current research activities, the provisions of pertinent legal instruments related to such activities, and recent activities of relevant organizations.[93]

130. The Convention on Biological Diversity defines genetic resources as "genetic material of actual or potential value", and genetic material as "any material of plant, animal, microbial or other origin containing functional units of heredity" (art. 2). Since it is now known that every cell of every living organism contains "functional units of heredity", this definition is a broad one. In the context of the present report, "resources" refer not only to organisms of direct value to human society but also to those organisms that are of indirect value through the regulating services that they provide in terms of maintenance and homeostasis of habitats and biological diversity, among others.

B. Understanding marine genetic resources

1. Nature of marine genetic resources

131. From a scientific point of view, genes are sequences of deoxyribonucleic acid (DNA) bases, nucleotides, within nucleic acid molecules each of which determines

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microbiological implications", in *Applied Microbiology and Biotechnology*, Vol. 59, Nos. 2-3 (2002); T. Taguchi, "Development of marine-derived anti-cancer compounds", in *Gan To Kagaku Ryoho*, Vol. 30, No. 5 (2003); M.V. De Souza, "(+)-discodermolide: a marine natural product against cancer", in *ScientificWorld Journal*, Vol. 4 (2004); D. Sipkema, M. C. Franssen, et al., "Marine sponges as pharmacy", in *Marine Biotechnology*, Vol. 7, No. 3 (2005).

[92] Contribution from the French Research Institute for Exploitation of the Sea (IFREMER).

[93] The present chapter is based on publicly available information, information received from some of the relevant organizations, as well as contributions from the following experts: W. H. Gerwick and M. C. Machado. Valuable information was also provided by IFREMER.

the primary structure of proteins or polypeptide molecules. Genes and heredity, which is the inheritance of this information through reproduction, are linked and the term "genetic" implies that a sequence of nucleotides is or can be duplicated. Genes become resources when they are of actual or potential value to human society and the information they harbour can be replicated in laboratory.

132. All kingdoms of life, including the Animalia, Planta, Fungi, Protista and Monera (Eubacteria and Cyanobacteria), are reproductively based on duplication of polymers of DNA, and hence, encompass genetic resources. Marine genetic resources therefore include a broad range of macro- and micro-organisms. The latter, which include bacteria, archae, fungi, yeasts, and viruses, are the world's most genetically diverse organisms. Although viruses are not capable of independent reproduction and are parasitic upon host organisms to complete this process, they contain either DNA or ribonucleic acid (RNA) and therefore carry genetic information which can be captured by laboratory methods. In the case of bacteria, it is important to note that many of them have been carried into the marine environment by wind, soil or biological sources. Some scientists consider that marine bacteria are only those that are capable of growth and reproduction in salt water, thereby excluding bacteria that are only present transiently in the marine environment and are not capable of reproduction in the salty environment. Other researchers have proposed the all-encompassing concept of "ocean gene pool", which includes all genes that can be isolated from the oceans, irrespective of their origin.[94]

133. Proteins, which are the products of genes and are not capable of independent reproduction, are prime candidates among which to prospect for pharmaceuticals or agrichemicals. Among those are enzymes, which catalyse specific biochemical reactions such as small molecules with secondary adaptive functions, such as warding off of potential predators and chemical communication between or within a species. Because of their absolute dependence on and connection to genetic information, proteins, other biopolymers, and small organic molecules with adaptive functions can also be considered as marine genetic resources.[94]

2. Status and sources of knowledge on marine genetic resources

134. Many habitats of the world's oceans are entirely unexplored. As a result, only a fraction of the oceans' biodiversity, which includes genetic diversity, is known. New marine species are regularly discovered (see para. 265 below). The deep oceans, tropical reef ecosystems, and polar regions are examples of ecosystems hosting marine resources yet to be discovered (see A/60/63/Add.1, para. 55).

135. Common seawater is also host to thousands of microbial strains that are at present not studied or characterized because the capacity to culture them in laboratory is currently lacking. Scientists estimate that current methodologies are only capable of culturing 0.1 to 1.0 per cent of the diverse bacteria present in common seawater.[95] Microbes constitute over 50 per cent of the biomass in the

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[94] Contribution from W. H. Gerwick.

[95] J. M. Gonzalez, W. B. Whitman, et al., "Identifying numerically abundant cultures of bacteria from complex communities: an example from a lignan enrichment culture", in *Applied and Environmental Microbiology*, Vol. 62, No. 12 (1996); F. Schut, E. J. De Vries, J. C. Gottschal, et al., "Isolation of Typical Marine Bacteria by Dilution Culture: Growth, Maintenance, and Characteristics of Isolates under Laboratory Conditions", ibid., Vol. 59, No. 7 (1993).

oceans and can have a profound impact on an environment.[96] In the last 15 years, there has been a revolution in the understanding of the contribution of microbial organisms to production, biochemical cycling and diversity in the oceans. Despite these advances, the available knowledge is still in its infancy and marine microbiology is underdeveloped because fundamental methods in marine microbiology are still lacking.[94] Inventory of microbial diversity in marine environments is still far from complete and will require at the very least several decades to improve.[92]

136. Marine invertebrates and algae are host to many associated species of micro-organisms; however, the nature of these associations, the complexity of the interactions between host and symbionts, and the metabolic capacities of the respective partners is essentially unknown except in a very few cases.[97] A lack of trained taxonomists is also currently a major barrier to overcoming the lack of understanding of the biology of marine organisms (see A/60/63/Add.1, para. 56).

137. It is therefore important that research continues in order to improve our knowledge of the biological processes driving the marine biosphere, in particular the role of marine micro-organisms. Key to furthering scientific investigation is the establishment of databases and culture collections, which facilitate access to information on marine micro-organisms and, in some cases, to the organisms themselves.

138. *Scientific databases*. A number of databases are the result of work to survey and create inventories of marine organisms. For example, AlgaeBase is a publicly funded and freely accessible database of information on algae that includes terrestrial, marine and freshwater organisms. At present, the data for the marine algae, particularly seaweeds, are the most complete.[98] AlgaeBase is part of the Species2000 initiative, which aims to create a validated checklist of all the world's species (plants, animals, fungi and microbes).[99] IFREMER maintains an open database on deep-sea benthic ecological data, "Biocean", which aims to collect operational data from research cruises, organize faunal and environmental data in a standardized form, and preserve data for studies of long-term temporal changes[100] (see also A/60/63/Add.1, para. 76).

139. *Culture collections and gene banks*. The majority of companies and research institutes maintain in-house collections of genetic resources, including micro-organisms, plants, animals, fungi, bacteria, and products of these resources such as enzymes, purified compounds, and extracts. These collections are important in enabling researchers to access marine genetic resources. Based on the samples of fluids, rocks, sediments and animals collected in deep-sea extreme environments (hydrothermal vents, cold seeps, subsoils, and deep-sea trenches), collections of strains have been established by various institutions having access to sampling technology. It appears, however, that among thousands of strains, a relatively low number of bacteria and archaea have been described, published and deposited in international reference microbial collections. Most of the isolated strains remain

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[96] See http://www.comisecretariat.org/Dev2Go.web?id=250217.

[97] M. Hildebrand, L. Waggoner, et al., "Approaches to identify, clone, and express symbiont bioactive metabolite genes", in *Natural Product Reports*, Vol. 21, No. 1 (2004).

[98] See http://www.algaebase.org.

[99] See http://www.sp2000.org/index.php.

[100] See http://www.ifremer.fr/biocean/indexgb.html.

under the control of the institutions involved in isolation steps and are subject to limitations in their diffusion to third parties. These collections of unpublished strains seem to constitute the core of the genetic resources used for biotechnology applications.[92]

140. Culture collections and gene banks, which are found both in developing and developed countries, include those of biotechnology companies, universities, national culture collections, and international collections.[101] Access to samples from these collections is generally subject to material use agreement or material transfer agreements, which include provisions on the type of use of the sample allowed under the agreement, and on ownership and intellectual property rights over the material. Transfer is usually subject to the payment of a nominal fee. For example, the Biological Resource Center at the Marine Biotechnology Institute in Japan has been collecting bacteria, fungi and microalgae from open sea, coastal and estuarine waters to establish a comprehensive culture collection, the Marine Biotechnology Institute Culture Collection, which contains approximately 700 strains of marine bacteria and 300 microalgae. The Collection maintains an online catalogue accessible to the public, which includes the scientific name, sampling information, phenotypic characteristics, culture conditions, and gene sequences used for the phylogenetic analyses. Information on industrial application is provided with every strain. The Collection strains are only distributed for research purposes under materials use agreements. The distribution of any strain collected in the territorial waters of any country other than Japan requires authorization from the relevant Government.[102]

141. The United States National Cancer Institute's Departmental Therapeutics Programme, as it investigates the potential of natural products in drug discovery and development, including from marine macro-organisms and microbes, has acquired 13,000 marine invertebrate samples, in addition to 3,000 marine plants and 25,000 fungal extracts from more than 30 tropical or sub-tropical source countries or their source country organizations. These extracts are included in its National Products Repository and are available to qualified organizations for further study, subject to the signing of a material transfer agreement, which protects the rights of all parties, including those of the countries of origin of the natural source materials. Most of the sample materials screened by the Programme have been obtained under letters of collection or memoranda of understanding negotiated with, or involving, source countries.[103] The Commonwealth Scientific and Industrial Research Organisation maintains the Collection of Living Microalgae, a culture collection of over 800 strains, including representatives from all classes of marine microalgae, some freshwater microalgae, and unusual marine microheterotrophs. The culture collection includes microalgae from tropical to polar waters in the Australian region, as well as microalgae from around the world. Information on individual strains is

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[101] See, e.g., http://wdcm.nig.ac.jp/hpcc.html for a list of culture collections of marine and terrestrial micro-organisms around the world. The World Data Centre for Micro-organisms provides a comprehensive directory of culture collections, databases on microbes and cell lines, and the gateway to biodiversity, molecular biology and genome projects. It lists 552 culture collections in 66 countries.

[102] See http://seasquirt.mbio.co.jp/mbic/index.php?page=mbichome.

[103] "Technology Transfer Practices of the US National Cancer Institute's Departmental Therapeutics Programme", Communication from the United States to the World Trade Organization Council for Trade-Related Aspects of Intellectual Property Rights, document IP/C/W/341.

obtained from the Collection's online database.[104] The Collection of Aquatic Important Micro-organisms of the Center of Research for Nutrition and Development at Mazatlán, México, aims to acquire, study, and preserve bacterial strains obtained from aquatic systems and aquacultural facilities, that are important to industry. The culture collection maintains over 1,800 strains, most of them belonging to the bacteria Vibrionaceae.[105] The Moroccan Coordinated Collections of Micro-organisms is a network for science and research, which aims to create a national tool for promoting scientific interest and investigations in microbial biodiversity, both terrestrial and marine, within the Moroccan academic and bioindustry communities. The Collections contain approximately 3,000 micro-organisms including bacteria and algae. An online catalogue is also freely accessible. When ordering from the Collections, the purchaser must agree to the terms of a material transfer agreement.[106]

142. With the advent of metagenomic methods allowing a direct access to genes contained in DNA extracted from crude samples, gene libraries represent a more and more important point of access to genetic resources, emerging in parallel to strain collections.[92] Sequencing of the total genomes of marine organisms is a rapidly advancing, yet new area of research. Genomic libraries, created to preserve all the genes found in marine organisms, can provide genes for cloning and synthetic expression as a chemical compound.[107]

143. *Patent databases*. Patents confer upon their holders rights over an invention in exchange for publication of information on their invention (see para. 221 below). Information on marine genetic resources, in particular their actual and potential uses, can therefore be found in patent descriptions and applications. The expansion and internationalization of the patent system has led to increasing dependence on the use of databases,[108] and most of the regional and national patent offices in developed and developing countries have created searchable databases, increasingly available on the Internet.[109] While a variety of commercial database services are available for patent research, these are generally beyond the resources of most researchers.[108] In contrast, esp@cenet, the metadatabase maintained by the European Patent Office, is the largest freely accessible database of its type and contains patent documents from over 70 countries, four regional patent offices and the World Intellectual Property Organization.

144. It is difficult to quantify with exactitude the number of patents issued in respect of inventions based on marine genetic resources as a result of several

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[104] See www.marine.csiro.au/microalgae and www.marine.csiro.au/microalgae/orderform.pdf.

[105] See http://www.ciad.mx/caim/.

[106] See http://www.ccmm.ma/about.htm and www.ccmm.ma/Materiel%20Transfer%20Agreement%202003.doc.

[107] "Marine and coastal biological diversity — status and trends of, and threats to, deep seabed genetic resources beyond national jurisdiction, and identification of technical options for their conservation and sustainable use", Note by the Executive Secretary, UNEP/CBD/SBSTTA/11/11.

[108] P. Oldham and A. M. Cutter, "Mapping Global Status and Trends in Patent Activity for Biological and Genetic Material", in *Genomics, Society and Policy*, Vol. 2, No. 2 (2006).

[109] See, for example, the databases of the Indian Patent Facilitating Centre (http://pfc.org.in/db/db.htm), the United States Patent and Trademark Office (http://www.uspto.gov/patft/index.html), the Japan Patent Office (http://www.ipdl.ncipi.go.jp/homepg_e.ipdl), and esp@cenet (European Patent Office) (http://ep.espacenet.com/?locale=en_EP).

factors, including: the content and geographic coverage of the database; the accuracy of the search algorithm; and the current configuration of the patent classification system, which, among others, does not lend itself to a search by provenance of the organisms. Desk research has shown that the patents issued, and applied for, cover a wide range of inventions and that the holders are indiscriminately public and private entities.[110] A UNEP report estimates that at least 37 patents have been issued for products based on deep sea organisms.[111]

C. Activities related to marine genetic resources

145. Activities related to marine genetic resources appear to be of three types: scientific investigation of the oceans and their biological processes; research and development or "bioprospecting"; and exploitation. The frontier between scientific investigation and research and development is becoming increasingly unclear since genetic resources are usually collected and analysed as part of scientific research projects, in the context of partnerships between public research institutes and biotechnology companies. It is often only at a later stage that the knowledge, information and useful materials extracted from such resources enter a commercial phase (see A/60/63/Add.1, para. 202).

1. Scientific investigation of the oceans and their biological processes

146. Several research activities are carried out to study the ecology, biology and physiology of marine species and organisms. The majority of these activities are carried out on a small scale, spread among independent research activities and programmes in many universities and research institutions around the world.

147. Among the programmes of an international nature, Diversitas, an international initiative on biodiversity science, has established "bioDISCOVERY" as one of its core projects to advance efforts to measure and describe biodiversity at the level of genes, species and ecosystems.[112] The Census of Marine Life is a global network of researchers engaged in an initiative to explain the diversity, distribution and abundance of marine life in the oceans. It has several field projects observing organisms in a variety of regions with the aim to build regional-to-global scale species-level biological inventories, among others. These field projects include the Coral Reefs, Census of Diversity of Abyssal Marine Life, Census of Marine Zooplankton, the Biogeography of Deep-Water Chemosynthetic Ecosystems, Global Census of Marine Life on Seamounts, Census of Antarctic Marine Life, and the International Census of Marine Microbes.[113]

148. Hotspot Ecosystems Research on the Margins of European Seas is an international, multidisciplinary research programme investigating Europe's deep marine ecosystems and their environment. The research consortium comprises 50 partners from 17 European and neighbouring countries, including both public

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[110] In relation to patents related to deep sea organisms, see, for example, *Bioprospecting of Genetic Resources in the Deep Seabed: Scientific, Legal and Policy Aspects* (UNU, Institute of Advanced Studies, 2005).

[111] UNEP Regional Seas Report and Studies, No. 178, *Ecosystems and Biodiversity in Deep Waters and High Seas* (UNEP/IUCN, Switzerland, 2006).

[112] See http://www.diversitas-international.org/core_biodisc.html.

[113] See http://www.coml.org.

institutions and private companies. Sampling is performed in the seabed to identify megafauna, macrofauna, meiofauna, microfauna, and bacteria, and to perform identification and taxonomic studies including genetic analysis of the species.[114] IFREMER, the missions of which include enhancing knowledge of ocean and ocean resources and monitoring marine and coastal zones, is currently running a programme, which aims to study human impacts, in particular nodule mining impacts, on deep-sea ecosystems.[92]

149. Additional information on exploratory research activities, including the developing field of marine genomics, is contained in document A/60/63/Add.1, paras. 45-54.

2. Bioprospecting

150. Research and development related to marine genetic resources is commonly referred to as "bioprospecting". While there is no universally agreed definition of bioprospecting (see A/60/63/Add.1, para. 203), the term is generally understood, among researchers, as the search for biological compounds of actual or potential value to various applications, in particular commercial applications. This involves a series of value-adding processes, usually spanning several years, from biological inventories requiring accurate taxonomic identification of specimens, to the isolation and characterization of valuable active compounds. As a mere prospecting activity, bioprospecting is only the first step towards possible future exploitation and stops once the desired compound or specific property has been isolated and characterized. In recent years, the term "biodiscovery" has been preferred to "bioprospecting" to put greater emphasis on the investigative aspect of the research and less on the idea of future exploitation, in particular since the chances of success of a natural compound actually entering a clinical and commercial phase are said to be slim.[115]

151. The industries of which bioprospecting is a part are research intensive. While many of the sectors are dominated by large multinational companies, a significant and growing portion of research and development is done by smaller companies. Large companies then license-in promising products, or acquire smaller companies with interesting pipelines. Thus, there is a range and variety of companies and business models that study and develop genetic resources.[116] It has been estimated that at least 14 biotechnology and other companies are actively involved in product development and/or collaboration with research institutions in search for new substances and compounds from marine organisms and genetic resources.[111] Obtaining information on the nature of such partnerships, including the source of the target organisms and contractual terms, is difficult owing to the limited information publicly available. Below are a few examples of such partnerships (ibid., paras. 84-87).

152. The Marine Bioproducts Engineering Center, a research centre of the National Science Foundation in the United States, which aims to develop the engineering

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[114] See http://www.eu-hermes.net.

[115] Report of the Workshop on Bioprospecting in the High Seas (University of Otago, Dunedin, New Zealand, 27-29 November 2003).

[116] "The commercial use of biodiversity: an update on current trends in demand for access to genetic resources and benefit-sharing, and industry perspectives on access and benefit-sharing policy and implementation", UNEP/CBD/WG-ABS/4/INF/5, available at www. biodiv.org.

technology and science base for the commercial production of high-value marine bioproducts, has established an Industry Sponsors Program. As an Industry Sponsor, a number of biotechnology companies have been provided with a seat on the Industrial Advisory Board, access to the Center's culture collection containing almost 200 microalgae, 175 cyanobacteria and 200 photo bacteria, and a right to negotiate licensing or option agreements, at preferential terms, on technology and patents arising out of Center-funded research.[117] The University of Hawaii has also signed a Biodiversity Collaboration Agreement with a biotechnology company, which develops high-performance specialty enzymes from microbes sampled in extreme ecosystems, including deep sea hydrothermal vents.[118] Under the Agreement, the Center for Marine Microbial Ecology and Diversity of the University of Hawaii has been issued a non-exclusive research licence to a patented technology directed to the sequencing of DNA from life forms in exchange for genetic material from samples in and around Hawaii.[119]

153. IFREMER, which has among its priorities the development of marine biotechnologies,[120] has created with other partners a marine biotechnology company to develop and sell products based on micro-organisms discovered by IFREMER in the deep sea.[121]

154. These and other examples show that marine scientists and bioprospectors depend on each other to gain access to the resources, develop novel products and increase our knowledge of the oceans and their resources. As marine scientists and taxonomists continue to work to expand our knowledge, bioprospectors can have direct access to information on species names, distribution, and abundance and perhaps even phylogenetic frameworks on which to build hypotheses of occurrence of particular classes of compounds.[122] Conversely, sampling carried out for bioprospecting or biodiscovery purposes often drive survey projects in many habitats, including extreme habitats.

3. Exploitation of the resources

155. The exploitation of genetic resources for the development of commercial products or processes requires considerable investments and specific conditions in terms of equipment, among others.[92] The following estimates show that yielding valuable compounds from source materials is difficult: 450 kilograms of acorn worms yielded 1 milligram of cephalostatin; 1,600 kilograms of sea hares yielded 1 milligrams of dolastatin; and 2,400 kilograms of sponge yielded less than 1 milligram of spongistatin.[115] This has to be considered in light of the time and costs associated with research and development, human clinical trials and marketing. As of 2005, approximately 20 marine natural products were undergoing human clinical trials.[123] Some products have entered markets (see paras. 165 and 176 below).

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[117] See the Center's website and the Industry Sponsor Program at http://cmmed.hawaii.edu/industry.

[118] See Diversa website at http://www.diversa.com/index.html.

[119] See http://ir.diversa.com/phoenix.zhtml?c=81345&p=irol-newsArticle&ID=638191&highlight=.

[120] See http://www.ifremer.fr/anglais/institut/missions.htm.

[121] IFREMER Annual Reports 2004 and 2005, available at http://www.ifremer.fr.

[122] Contribution from M. C. Machado.

[123] "Recent Trends in the Biological Prospecting", Information Paper submitted to the twenty-ninth Antarctic Treaty Consultative Meeting, document IP116.

156. With advances in technology and molecular methods, it is thought that encoding genes for the enzymes that create molecules of pharmaceutical or biotechnological value can be harvested and used to create molecules in plentiful supply through the expression of these genes in fermentable micro-organisms (heterologous expression).[124] By rearranging or otherwise mixing and matching biosynthetic genes from different pathways, it is also hoped that engineering natural product-like molecules of high complexity and valuable biological properties will be possible.[125] Except in a few cases, however, this has not been achieved yet for any organism, terrestrial or marine.[126] Much fundamental knowledge of these pathways, how the enzymes function as well as how they work in cooperation with other enzymes in the sequence, needs to be developed before this can be realized.[94] Owing to various factors, including technological limitations, the exploitation of marine genetic resources is therefore a challenge.

D. Services provided by marine genetic resources

157. Ecosystem services are the benefits that humans obtain from ecosystems. These include provisioning services such as food, regulating services such as climate regulation, cultural services such as education, and supporting services such as nutrient cycling and primary production.[127] Marine organisms play a key role in the ecosystem services provided by the oceans.

1. Supporting and regulating services

158. Oceans support human life on Earth. They not only provide a source of food, but also generate nearly half of the oxygen in the atmosphere, derived from the photosynthetic process of planktonic microalgae and nearshore marine angiosperms and macroalgae. Oceans absorb huge quantities of carbon dioxide (CO_2) and influence climate and weather patterns. Planktonic marine microalgae contribute between 80 to 90 per cent to the ocean's productivity both in terms of carbon assimilation and oxygen generation.[94] As key players in the nutrient cycle, where they act as decomposers, marine micro-organisms also play an essential role in degrading toxins and other pollutants of both natural and human origin. Oil, polychlorinated biphenyls, other halogenated organic chemicals, and heavy metals are all known to be degraded, altered or detoxified by microbial processes.[128] Two recent discoveries illustrate the fundamental contribution of the microbial compartment to the understanding of life and biogeochemical cycles in the oceans: new picoplankton groups such as Prochlorococcus and Synechococcus were found

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[124] K. Terpe, "Overview of bacterial expression systems for heterologous protein production: from molecular and biochemical fundamentals to commercial systems", in *Applied Microbiology and Biotechnology*, Vol. 72, No. 2 (2006).

[125] H. G. Floss, "Combinatorial biosynthesis-Potential and problems", Journal of Biotechnology, Vol. 124, No. 1 (2006); U. Galm and B. Shen, "Expression of biosynthetic gene clusters in heterologous hosts for natural product production and combinatorial biosynthesis", in *Expert Opinion on Drug Discovery*, Vol. 1, No. 5 (2006).

[126] J. Staunton, "Combinatorial biosynthesis of erythromycin and complex polyketides", in *Current Opinion in Chemical Biology*, Vol. 2, No. 3 (1998).

[127] Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being, A Framework for Assessment* (Washington, D.C., 2003).

[128] "Anaerobic-Aerobic Biodegradation of DDT (Dichlorodiphenyl Trichloroethane) in Soils Corona-Cruz", in *Bulletin of Environmental Contamination and Toxicology*, Vol. 63 (1999).

to play a key role in ocean biomass turnover; and a microbial consortium responsible for the anaerobic oxidation of methane shed partial light on the degradation of methane seeping from the sediments along the continental margin and contributes to the methane cycle and the regulation of the greenhouse effect.[92]

159. Marine micro-organisms are also essential to the maintenance of marine biodiversity. Genetic diversity provides a mechanism for populations to adapt to their ever-changing environment. Metabolites produced by some of the least showy organisms in the sea work their way through increasingly higher trophic levels to accumulate in some of the most distinctive and readily observed organisms, allowing them to adapt to their environment and deter predators.[129] The more variation in genes, the better the chance that at least some of the individuals of a species will have an allelic variant suited to the new environment, and will produce offsprings with the variant, who will in turn reproduce and continue the population. There is therefore a delicate interdependence between biological and genetic diversity. Changes in biodiversity result in changes in the environment, requiring subsequent adaptation of the remaining species. Changes in genetic diversity, particularly loss of diversity through loss of species, result in a loss of biological diversity.

2. Provisioning services

160. Provisioning services of marine life forms, in particular genetic resources, include employment, food, raw materials and research. Marine genetic resources have a great potential for the development of products of benefit to human society, but also to increase our knowledge of the history of life on Earth.

161. *Scientific knowledge*. Owing to the wide variety of extreme environments, deep-sea ecosystems provide examples of molecular adaptation to extreme conditions, all of which may help understand the selective processes that allow evolution and persistence of life forms in extreme conditions. The bacteria and Archae living in extreme environments may be the closest descendants of the first life forms on Earth and from which all living creatures are derived. The description of biodiversity and genetic resources from the deep sea may therefore be the source of a fundamental knowledge to retrace the history of life on our planet.[92]

162. *Biotechnology*. Biotechnology is any technological application that uses marine biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use (see Convention on Biological Diversity, art. 2). Biotechnologies include bioprocessing technology, monoclonal antibodies, cell culture, recombinant DNA technology, cloning, protein engineering, biosensors, nanobiotechnology and microarrays. Advances in biotechnology, including the ability to transfer genetic material from one organism to another, have opened up the possibility of transferring segments of DNA responsible for the biosynthesis of secondary metabolites from unculturable bacteria. Synthetic methods are improving and will allow, at term, complex molecules to be synthesized on industrial scales (see A/60/63/Add.1, para. 78).

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[129] J. R. Pawlik, M. R. Kernan, et al., "Defensive chemicals of the Spanish dancer nudibranch Hexabranchus sanguineus and its egg ribbons: macrolides derived from a sponge diet", in *Journal of Experimental Marine Biology and Ecology*, Vol. 119, No. 2 (1988).

163. One of the well-known examples of use of marine micro-organisms for biotechnological purposes is the VentR®-polymerase, an improved version of Taq-polymerase, which revolutionized biology by providing a method of replicating DNA in laboratory. VentR®-polymerase, which was obtained from the deep sea vent bacterium *Thermococcus litoralis*, shows a 10- to 15-fold greater fidelity in copying DNA blueprints.[130] Corals and jellyfish are the source of a series of proteins, generally known as Green Fluorescent Proteins,[131] which were developed as a "reporter" system for protein expression in animals. The ability to readily visualize the molecular events that occur in cells during development, growth, and pathological conditions has been revolutionary in cell biology and medicine. Through investigation of how biosynthetic enzymes cooperate to make complex molecules, such as the curacin A molecule, isolated from the tuft forming cyanobacterium *Lyngbya majuscula*,[132] it is hoped that the genes can be captured and harnessed to create new curacin A-like compounds with better drug properties as well as better chemical stability. This type of gene engineering is still recent and, because of the complexity of the reactions they catalyze, among others, is likely to take a decade or more before being widely available and practical.[133]

164. *Health care*. Although marine microbiology is still in its infancy, the pace of discovery of new species, as well as of products that are potentially useful to pharmacology, is higher for marine and microbial life than for terrestrial organisms.[110] Compounds derived from marine micro-organisms are being used and tested in pharmacology for the development of hormonal modulators, antioxidant, antivirals, anti-inflammatory, anti-fungal, anti-HIV, antibiotic, anticancer, anti-tuberculosis and antimalarial drugs. For example, marine sediments from around the world have been found to contain various species of the streptomycete bacterium, *Salinospora*,[134] which produce a host of bioactive small molecules, the most significant to date being "salinosporamide". This small molecule is an inhibitor of the human proteasome, a multi-enzyme complex responsible for breaking down proteins within cells, and effective in killing cancer cells. Salinosporamide has been highly successful in preclinical evaluation as an anticancer agent, and is in current human Phase I clinical trials. Many cyanobacteria, when grown in the presence of

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[130] M. J. Brownstein, "Polymerase chain reaction", in *Encyclopedia of Biological Chemistry*, Vol. 3 (2004).

[131] N. Hayes, E. Howard-Cofield, et al., "Green fluorescent protein as a tool to study epidermal growth factor receptor function", in *Cancer Letters*, Vol. 206, No. 2 (2004); V. Ntziachristos, "Flourescence molecular imaging", *Annual Review of Biomedical Engineering*, Vol. 8 (2006); A. Prinz, M. Diskar, et al., "Application of bioluminescence resonanco energy transfer (BRET) for biomolecular interaction studies", in *ChemBioChem*, Vol. 7, No. 7 (2006); N. Bevan and S. Rees, "Pharmaceutical applications of GFP and RCFP", in *Green Fluorescent Protein* (2006, 2nd edition); T. H. Ward and J. Lippincott-Schwartz, "The uses of green fluorescent protein in mammalian cells", ibid. See also http://www.conncoll.edu/ccacad/zimmer/GFP-ww/GFP-1.htm.

[132] W. H. Gerwick, P. J. Proteau, et al., "Structure of curacin A, a novel antimitotic, antiproliferative, and brine shrimp toxic natural product from the marine cyanobacterium *Lyngbya majuscula*", in *Journal of Organic Chemistry*, Vol. 59 (1994).

[133] Z. Chang, N. Sitachitta, et al., "Biosynthetic Pathway and Gene Cluster Analysis of Curacin A, an Anti-tubulin Natural Product from the Tropical Marine Cyanobacterium *Lyngbya majuscula*", in *Journal of Natural Products*, Vol. 67 (2004); C. Khosla, "Combinatorial biosynthesis: new tools for the medicinal chemist", in *Chemtracts*, Vol. 11, No. 1 (1998).

[134] R. H. Feling, G. O. Buchanan, et al., "Salinosporamide A: a highly cytotoxic proteasome inhibitor from a novel microbial source, a marine bacterium of the new genus Salinospora", in *Angewandte Chemie*, International Edition, Vol. 42, No. 3 (2003).

ultraviolet (UV) light, produce a unique pigment known as "scytonemin",[135] which provides powerful protection against UV irradiation and has been considered for inclusion in human topical products for both its sunscreen properties and anti-inflammatory activity.[136] Several antitubulin molecules (dolastatin 10 and 15) isolated from marine cyanobacteria are current lead anticancer agents.[137] Cyanovirin, a ribosomally encoded protein isolated from marine cyanobacteria, is highly active at blocking the entry of various pathogenic viruses, including HIV and the hepatitis-C virus, into cells.[138] It is being evaluated for use with condoms and other preparations to inhibit the transmission of the virus.

165. The fish- and worm-hunting tropical marine snails of the genus *Conus*, in particular *C. geographus*, have been a source of anti-pain therapeutics. One of the peptides of the snail's toxin is highly effective in blocking pain neurotransmission, and has recently entered the market, under the trade name Prialt.[139] Naturally occurring toxins, in particular from microalgae, can also often serve as useful chemical tools for investigating signaling processes in neurobiology and other biological systems.[140] Many are sold as commercial products.

166. *Nutrition*. Fatty acids of various chain lengths and unsaturation patterns are present in all microbial life.[141] The health benefits of a marine fish diet, including lower cardiovascular disease and improved immune function, are partially due to the unique lipids contained in fish.[142] These lipids owe their origin, at least in part, to the microalgae, which form the food base for most fish. Food-related applications of marine genetic resources include food colorants and additives. For example, pigments known as carotenoids, rich in cyanobacteria, give the salmon flesh its pink

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[135] P. J. Proteau, W. H. Gerwick, et al., "The structure of scytonemin, an ultraviolet sunscreen pigment from the sheaths of cyanobacteria", in *Experientia*, Vol. 49, No. 9 (1993).

[136] C. S. Stevenson, E. A. Capper, et al., "Scytonemin — a marine natural product inhibitor of kinases key in hyperproliferative inflammatory diseases", in *Inflammation Research*, Vol. 51, No. 2 (2002).

[137] A. M. Burja, B. Banaigs, et al., "Marine cyanobacteria: A prolific source of natural products", *Tetrahedron*, Vol. 57, No. 46 (2001); W. H. Gerwick, L. T. Tan, et al., "Nitrogen-containing metabolites from marine cyanobacteria", in *Alkaloids* (Academic Press, 2001), Vol. 57 (Chemistry and Biology); T. L. Simmons, E. Andrianasolo, et al., "Marine Natural Products as Anticancer Drugs", *Molecular and Cancer Therapeutics*, Vol. 4 (2005).

[138] F. Helle, C. Wychowski, et al., "Cyanovirin-N Inhibits Hepatitis C Virus Entry by Binding to Envelope Protein Glycans", in *Journal of Biological Chemistry*, Vol. 281, No. 35 (2006).

[139] G. Stix, "A toxin against pain", in *Scientific American*, Vol. 292, No. 4 (2005).

[140] N. V. Kulagina, T. J. O'Shaughnessy, et al., "Pharmacological effects of the marine toxins, brevetoxin and saxitoxin, on murine frontal cortex neuronal networks", in *Toxicon*, Vol. 44, No. 6 (2004); M. A. Grant, X. J. Morelli, et al., "Conotoxins and structural biology: A prospective paradigm for drug discovery", in *Current Protein and Peptide Science*, Vol. 5, No. 4 (2004); Y. S. Cheng, J. D. McDonald, et al., "Concentration and particle size of airborne toxic algae (brevetoxin) derived from ocean red tide events", Environmental Science and Technology, Vol. 39 (2005); V. L. Trainera and G. Daniel, "Baden High affinity binding of red tide neurotoxins to marine mammal brain", in *Aquatic Toxicology*, Vol. 46 (1999); L. E. Llewellyn, "Saxitoxin, a toxic marine natural product that targets a multitude of receptors", in *Natural Product Reports*, Vol. 23, No. 2 (2006).

[141] J. G. Metz, P. Roessler, et al., "Production of polyunsaturated fatty acids by polyketide syntheses in both prokaryotes and eukaryotes", in *Science*, Vol. 293 (2001).

[142] R. Uauy-Dagach and A. Valenzuela, "Marine oils as a source of omega-3 fatty acids in the diet: how to optimize the health benefits", in *Progress in Food & Nutrition Science*, Vol. 16, No. 3 (1992).

colour.[143] Bacteria in general, and cyanobacteria in particular, are rich in various essential nutrients such as folate, B-complex vitamins and vitamin E.[144] Well-known examples of cyanobacteria used for human food include *Spirulina* and *Nostoc*.[145] Macroalgae have been an important commercial source of unique polysaccharides, including: carageenan, used in baked items, ice cream and other milk products; agar/agarose, used in gels in desserts (e.g. cake tops), soups, and some diet recipes; and alginate, used as thickeners in salad dressings and concrete additives, among others.[146]

167. *Aquaculture*. The increased public demand for seafood, combined with a decline in some fish stocks, has encouraged scientists and industry to study ways that marine biotechnology can increase the productivity and improve product quality in marine food products. Traits of particular interest include natural fish growth factors and natural defense compounds against microbial infections. Productivity is also improved through feed additives, vaccines and other pharmaceutical agents from marine organisms, in particular marine cyanobacteria.[147]

168. *Bioremediation*. Bioremediation is the use of living organisms, usually micro-organisms, for a wide variety of applications in hazardous waste treatment and pollution control. The majority of bioremediation applications use micro-organisms to identify and filter manufacturing waste before it is introduced into the environment or to clean up existing pollution problems. Marine cyanobacteria have been used in bioremediation of wastewater, especially in the removal of industry-derived substances such as phenol, calcium and chloride from factories processing bones, heavy metals including cobalt and cadmium, and melanoidin pigments found in distillery effluents.[148]

E. Organisms and areas of interest

1. Organisms of interest

169. Over the past five years, increased attention has been paid to the potential of micro-organisms. Enzymes, which are of particular interest to industry, are usually found in micro-organisms, in particular bacteria and fungi.[116] Viruses are the most common biological entities in the oceans in addition to micro and picoeukaryotes, bacteria and Archaea. Despite the fact that most of the viruses are still unknown,

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[143] F. M. Shahidi and J. A. Brown, "Carotenoid pigments in seafoods and aquaculture", in *Critical Reviews in Food Science and Nutrition*, Vol. 38 (1998).

[144] S. Singh, B. N. Kate, et al., "Bioactive compounds from cyanobacteria and microalgae: an overview", in *Critical Reviews in Biotechnology*, Vol. 25 (2005).

[145] Z. Khan, P. Bhadouria, et al., "Nutritional and therapeutic potential of Spirulina", in *Current Pharmaceutical Biotechnology*, Vol. 6 (2005).

[146] M. Nishizawa, "Algal polysaccharides in food industry and their utilization as functional foods", in *Current Topics in Food Science and Technology* (2005); and B. Larsen, "Alginic acid", in *Handbook of Phycological Methods: Physiological and Biochemical Methods* (1978).

[147] J. Bendera and P. Phillips, "Microbial mats for multiple applications in aquaculture and bioremediation", in *Bioresource Technology*, Vol. 94 (2004); Guide to Biotechnology (Biotechnology Industry Organization, 2007), available at http://www.bio.org.

[148] Y. Cohen, "Bioremediation of oil by marine microbial mats", in *International Microbiology*, Vol. 5, No. 4 (2002); T. Matsunaga, H. Takeyama, et al., "Screening of marine microalgae for bioremediation of cadmium-polluted seawater", in *Progress in Industrial Microbiology*, Vol. 35 (Marine Bioprocess Engineering) (1999).

being sometimes documented only by environmental clone sequences, their key roles in geochemical cycles, microbial population dynamics and lateral gene transfer are gradually emerging as a new paradigm in ocean sciences.[92] However, as shown in the paragraphs above, a wide range of marine organisms act as reservoirs of genetic resources of actual or potential value. The following are but a few examples of organisms of particular interest to scientists and industry.

170. *Bacteria*. Over the past 20 years, an increasing number of new genera and species of both hyperthermophilic and mesophilic bacteria have been isolated from deep-sea ecosystems. This new bacterial diversity includes strains able to produce novel molecules such as enzymes, polymers and other bioactive molecules. The physical, rheological and biological properties of bacterial exopolysaccharides and bacterial pigments, for example, can be exploited for a number of products and bioactive molecules ranging from emulsifiers to adhesives. [92]

171. *Fungi*. The examination of the world's oceans for new fungi, especially those that live in association with other organisms such as sponges, algae and corals, is a very recent pursuit. A marine sponge collected from Papua New Guinea was host to a fungus, *Acremonium* sp., which produces a series of unusual cytotoxic metabolites to cancer cells as well as antibacterial properties.[149]

172. *Micro- and macroalgae*. Microalgae, which are found in different phyla, are a largely untapped reservoir of novel and valuable bioactive compounds. Current research includes investigating the production of fatty acids, pigments, vitamins and other bioactive compounds by microalgae.[150] Red macroalgae have an outstanding capacity to make small-molecule natural products, which incorporate features of the unique environment in which they dwell.[94] The major producing algal species are *Gigartina* from Argentina and Chile, *Chondrus* from Newfoundland, and *Euchema* from the Pacific.[122] Algae are host to many associated species of micro-organisms.[151]

173. *Cnidaria*. This phylum includes animals such as corals, sea anemones and jellyfish. The typical characteristics of cnidarians are the presence of nematocysts, which are "harpoon-like" microscopic structures that synthesize and express a variety of peptidic or proteic components. Sea anemones are one of the most studied groups of cnidarians. To date, nearly 10 different valuable peptide toxins have been isolated from sea anemones.[122] Both soft and hard corals are rich in small-molecule natural products, in particular terpenoids. The anti-inflammatory terpene pseudopterosin was isolated from the Caribbean sea whip, *Pseudopterogorgia elizabethia*.[152] The extent to which the microalgae that live in symbiotic association

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[149] C. M. Boot, K. Tenney, et al., "Highly N-methylated linear peptides produced by an atypical sponge-derived Acremonium sp.", in *Journal of Natural Products*, Vol. 69, No. 1 (2006); B. Nicholson, G. K. Lloyd, et al., "Neuteboom ST. NPT-2358 is a tubulin-depolymerizing agent: in-vitro evidence for activity as a tumor vascular-disrupting agent", in *Anticancer Drugs*, Vol. 17 (2006).

[150] See CSIRO microalgae research at http://www.marine.csiro.au/microalgae/biotech.html.

[151] M. Hildebrand, L. Waggoner, et al., "Approaches to identify, clone, and express symbiont bioactive metabolic genes", in *Natural Product Reports*, Vol. 21, No. 1 (2004).

[152] A. M. S. Mayer, P. B. Jacobson, et al., "Pharmacological characterization of the pseudopterosins: novel anti-inflammatory natural products isolated from the Caribbean soft coral, Pseudopterogorgia elisabethae", in *Life Sciences*, Vol. 62, No. 26 (1998).

with these animals, known as zooxanthellae, are responsible for the production of the compounds obtained from this source is currently discussed.[153]

174. *Porifera*. One of the most primitive, most studied group and most prolific source of novel small-molecule natural products are the sponges. As sessile organisms, sponges have developed a vast array of chemical defences in order to compete for substrate and deter predators. Over the past 50 years, sponges have been considered as a gold mine with respect to the diversity of their secondary metabolites.[154]

175. *Ascidians*. As sessile animals, Ascidians or tunicates host secondary metabolites against predation and to compete for substrate. Ascidians are therefore as interesting as sponges for the search of bioactive compounds.[155]

176. *Molluscs*. Sea hares, which are soft and "shell-less" snails, have attracted the interest of researchers for their chemical defence mechanisms. Several valuable small molecules have been isolated from sea hares, such as dolastatins, a series of antitumor peptide/macrolides isolated from Dolabella auricularia. Sea hares are also known to produce cytotoxic and antimicrobial proteins.[156] Cone snails (genus *Conus*) are venomous marine mollusks that use small, structured peptide toxins (conotoxins) for prey capture, defence, and competitor deterrence. Peptide from *Conus* has been marketed for the treatment of chronic pain since 2004 as Ziconotide™.[157]

177. *Worms*. Marine worms, are also a productive source of small molecules with powerful biological properties, likely owing to their adaptive functions. An example is anabaseine, an alkaloid obtained from the worm *Amphiporus angulatus*, and found to be a powerful stimulator of nicotinic acetylcholine receptors.[158] A related

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[153] K. Russell, "Pseudopterosin production", Patent Cooperation Treaty, International Application (2005).

[154] C. P. Li, A. Goldin, et al.; T. Natori, K. Akimoto, et al.; S. Iwasaki; G. M. Cragg and D. J. Newman; G. Schwartsmann, A. Brondani da Rocha, et al.; P. Proksch, R. A. Edrada, et al.; T. Taguchi; M. V. De Souza; D. M. Sipkema, M. C. Franssen, et al. op. cit., note 91; I. Kitagawa, M. Kobayashi, et al., "Absolute stereostructure of swinholide A, a potent cytotoxic macrolide from the Okinawan marine sponge Theonella swinhoei", in *Journal of the American Chemical Society*, Vol. 112, No. 9 (1990).

[155] D. R. Appleton, M. J. Page, et al., "Kottamides A-D: novel bioactive imidazalone-containing alkaloids from the New Zealand ascidian Pycnoclavella kottae", in *Journal of Organic Chemistry*, Vol. 67, No. 15 (2002); D. D. Baker, and K. A. Alvi, "Small-molecule natural products: new structures, new activities", in *Current Opinion in Biotechnology*, Vol. 15, No. 6 (2004); R. G. Berlinck, E. Hajdu, et al., "Challenges and rewards of research in marine natural products chemistry in Brazil", in *Journal of Natural Products*, in Vol.67, No.3 (2004); J. W. Blunt; B. R. Copp, et al., "Marine natural products", in *Natural Products Reports*, Vol. 23, No. 1 (2006).

[156] R. Bai, P. Verdier-Pinard, et al., "Dolastatin 11, a marine depsineptide, arrests cells at cytokinesis and induces hyperpolymerization of purified actin", in *Molecular Pharmacology*, Vol. 59, No. 3 (2001); H. Kamiya, R. Sakai, et al., "Bioactive molecules from sea hares", Progress in Molecular and Subcellular Biology, Vol. 43 (2006).

[157] G. P. Miljanich, "Ziconotide: neuronal calcium channel blocker for treating severe chronic pain", in *Current Medicinal Chemistry*, Vol. 11, No. 23 (2004); E. Prommer, "Ziconotide: a new option for retractory pain", in *Drugs Today*, Vol. 42, No. 6 (2006); E. Prommer, "Ziconotide: can we use it in palliative care?", in *American Journal of Hospice and Palliative Care*, Vol. 22, No. 5 (2005).

[158] W. R. Kern, "Alzheimer's drug design based upon an invertebrate toxin (anabaseine) which is a potent nicotinic receptor agonist", in *Invertebrate Neuroscience*, Vol. 3, Nos. 2-3 (1997).

synthetic compound, known as DMXBA or GTS-21 is in clinical trial for treating cognitive problems associated with schizophrenia.[94]

178. *Fish and mammals*. Observations in mammals have revealed that cartilage, a tissue naturally lacking in blood vascularization, contained compounds that potently inhibited new blood vessel growth. Sharks, which lack bones but are rich in cartilage, were studied and two shark-derived products are in clinical trial for their ability to inhibit the vascularization associated with tumor growth.[159] One of these, Neovastat (AE-941), is currently in phase III trials for the treatment of metastatic lung tumors. Genetic investigations are now focusing on the genes which encode some of these anti-angiogenic factors to produce the peptides through industrial fermentation processes, thus preventing harvesting of the wild animals.[122]

2. Areas of interest

179. *Physical features of interest*. Hot spots of diversity and biological activity in the oceans are found in areas associated with coral reefs, oceanic islands, seamounts and other topographic and hydrographic areas such as canyons and fronts. The history of novel products shows, however, that they are not necessarily based on micro-organisms from biodiversity-rich areas.[110]

180. Interest is generated by micro-organisms associated with endemic fauna and flora,[116] as well as micro-organisms found in extreme habitats in terms of temperature, pressure, toxicity, acidity and salinity (extremophiles), such as Antarctica and the deep ocean, below the sea floor and deeper into the subsurface.[160] Bacteria occupying unique and often extreme habitats in the ocean display adaptations to these environments, which can subsequently be harnessed in biotechnological applications. Examples of such habitats include salt ponds, coral reef crests, and hydrothermal vents. Of note in this regard, is the symbiotic relationship that micro-organisms have with deep sea minerals and other non-living resources (see A/60/63/Add.1, para. 237). Recent investigations of deeper water sediments have revealed a unique rich and active marine microbiology. Upon death of any marine organism, a portion of the organism's DNA is released in the ocean as naked DNA. The largest reservoir of DNA in the world's oceans, estimated at 0.45 gigatons, is present in the top 10 centimetres of deep sea sediments.[161] Although samples are still under process, first results have also led to the conclusion that habitat diversity between nodules fields would sustain a higher biodiversity than surrounding abyssal plains.[92]

181. Near-shore and pelagic seawater is also host to thousands of microbial strains that are presently not studied or characterized because of the lack of capacity to culture them in laboratory.[162]

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[159] J. Cho and Y. Kim, "Sharks: A Potential Source of Antiangiogenic Factors and Tumor Treatments", in *Marine Biotechnology*, Vol. 4, No. 6 (2002).

[160] *The International Regime for Bioprospecting: Existing Policies and Emerging Issues for Antarctica* (UNU Institute of Advanced Studies, 2003); available at http://www.ias.unu.edu.

[161] A. Dell'Anno and R. Danovaro, "Extracellular DNA Plays a Key Role in Deep-Sea Ecosytem Functioning", in *Science*, Vol. 309, No. 5744 (2005).

[162] J. M. Gonzalez, W. B. Whitman, et al., "Identifying numerically abundant cultures of bacteria from complex communities: an example from a lignon enrichment culture", in *Applied and Environmental Microbiology*, Vol. 62 (1996); F. Schut, E. J. De Vries, et al., "Isolation of Typical Marine Bacteria by Dilution Culture: Growth, Maintenance, and Characteristics of Isolates under Laboratory Conditions", ibid, Vol. 59 (1993).

182. *Geography*. Major hot spots are located in the tropical Indo-Pacific area, in particular on the seamounts in the Pacific, Indian and Atlantic Oceans. Although hot spots in species diversity are located mainly in the subtropics, hot spots of productivity with a high importance to pelagic predators have also been located in temperate and polar zones (see A/60/63/Add.1, para. 44). Among the examples highlighted in this section, the highest diversity of sea hares, nudibranchs and gastropod mollusks is found along the coral barrier reefs of the Caribbean sea and warm waters from the Indian Ocean and Oceania. The highest abundance of cone snails is observed in very warm waters, such as the Great Barrier Reef in Australia and the corals of the Philippines and Indonesia. The *Conus* genus in the Atlantic Ocean is observed around Cape Verde and the north-east coast of Brazil.[122] The waters of the African continent are also starting to be explored and seven previously described compounds and four novel compounds, with varying activity against cancer cell, were isolated from sponges collected in subtidal benthic ecosystems off the coast of southern Africa.[163]

F. Anthropogenic stresses on marine genetic resources

183. Previous reports of the Secretary-General have highlighted the various activities and phenomena that could have an impact on marine biodiversity, including fishing, climate change, pollution from various sources, the introduction of alien species, mineral exploitation, anthropogenic underwater noise, marine debris, scientific research, carbon sequestration, tourism and pipelines and cables (see A/59/62 and A/60/63/Add.1). A loss in marine biodiversity would result in a loss in genetic diversity. The following are examples of ways marine genetic resources can be impacted by stresses of an anthropogenic nature.

184. *Ocean acidification*. The increased dissolution of CO_2 in the ocean has led to a measurable increase in its acidity, estimated to lower to 7.95 by the year 2100. Because of the complex interactions between coral reef biology and this global-scale stress, it is not certain how individual species or whole reefs will be impacted. Recent experimental studies show a decrease in the ability of some coral species to produce calcium carbonate under lower dissolved carbonate conditions and higher ocean acidity. Other coral species may be adaptable to changing ocean chemistry and capable of calcifying at healthy rates.[164]

185. *Research and development*. Bioinformatics, which is the application of information technologies to biodiversity studies and their applications, is increasingly being made available, including through open source software, and is likely to change the way research and development related to genetic resources is conducted (see A/60/63/Add.1, paras. 91-93). This and other scientific and technological developments have made it possible for researchers to generate diversity in laboratory, where existing genome sequences and databases can yield novel structures. The impact of these developments on demand for genetic resources

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[163] C. E. Whibley, R. A. Keyzer, et al., "Antiesophageal Cancer Activity from Southern African Marine Organisms", *Natural Products and Molecular Therapy*, Vol. 1056 (2005).

[164] Ocean acidification due to increasing atmospheric carbon dioxide (Royal Society, 2005); A. Ridgwell and R. E. Zeebe, "The role of the global carbonate cycle in the regulation and evolution of the Earth system", in *Earth and Planetary Science Letters*, Vol. 234, Nos. 3-4 (2005); and "Increasing ocean acidity threatens coral reefs worldwide", in *Currents* (Winter 2004/2005).

from the wild is unknown, but it is likely that nature will continue to be a source for original novelty and complexity.[116]

186. Samples of micro-organisms needed for biotechnology research tend to be small, typically a few grams of soil or millilitres of water, and recollection is not usually necessary. Some marine animals are still being collected from the wild, however. In such cases, the impact on the target species depends on several factors including the conservation status of the species, its distribution, or whether it is targeted in one narrow area. Some species of sharks, for example, are listed on the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (see para. 178 above). In addition, in-situ sampling may sometimes impact the surrounding environment of the target organism. Since the late 1970s technological progresses, such as multibeam echo sounders, submersibles and in-situ sensors, have allowed access to small fragmented geological features such as hydrothermal vents, cold seeps, canyons, sponge reefs, deep sea corals situated on continental margins, seamounts, oceanic and volcanic ridges and back-arc basins. In these fragmented areas, where physical and chemical gradients are sharp, sampling from the surface using grabs, corers, dredges and trawls which are not adapted to scale may be destructive for fragile environments.[92]

187. To date, no systematic assessment has been undertaken of the specific environmental impacts that bioprospecting may have. Such impacts are likely to depend on a number of factors, which, apart from those related to the target organism and its surrounding environment, include the pace of discovery and commercialization of bioactive compounds from marine organisms and trends in demand for novel natural products from the sea.

G. Relevant international instruments

188. UNCLOS sets out the legal framework within which all activities in the oceans and seas must be carried out. It recognizes the desirability of establishing through UNCLOS, with due regard for the sovereignty of all States, a legal order for the seas and oceans which will facilitate international communication and promote the peaceful uses of the seas and oceans, the equitable and efficient utilization of their resources, the conservation of their living resources and the study, protection and preservation of the marine environment (Preamble). Although the term "genetic resources" is not used in UNCLOS, activities related to marine genetic resources are governed by the relevant general principles of UNCLOS and are to be undertaken within its legal framework.

189. In addition to UNCLOS, a number of other international instruments are relevant, including the Convention on Biological Diversity, CITES and treaties related to intellectual property. In particular, the Convention on Biological Diversity has for objectives the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding (art. 1).

1. Utilization and conservation of marine genetic resources

190. It is important to keep in mind the difference in the nature of the activities related to the utilization and conservation of marine living resources and those related to marine genetic resources. Like fishing, bioprospecting aims at taking living resources from the oceans. However, fishermen are interested in the whole fish or tangible parts of them for consumption. In order to be profitable, fishing operations usually require a substantial amount of catch. On the contrary, bioprospecting, as it targets the functional units of heredity contained in the reservoir constituted by the body of the harvested individual, only usually requires small quantities of sediment or water (in the case of micro-organisms) or of individuals for laboratory analysis. Bioprospecting does not always lead to exploitation and consumption and, when it does, it is only after a series of value-adding research activities on the genetic material, possibly spanning several years, which have made it possible to identify a potential application, including commercial uses.

(a) Marine genetic resources within national jurisdiction

191. *UNCLOS*. In its internal waters, archipelagic waters and territorial sea the coastal State has sovereignty not only over the maritime space but also over the resources found therein. Sovereignty over the archipelagic waters and the territorial sea is subject to a right of innocent passage for foreign ships (arts. 17 and 52). Passage ceases to be innocent if a foreign ship engages, among others, in any fishing activities and the carrying out of research or survey activities (art. 19). During transit passage through straits used for international navigation and archipelagic sea lanes passage, foreign ships, including marine scientific and hydrographic survey ships, may not carry out any research or survey activities without the prior authorization of the States bordering straits (art. 40) or the archipelagic State (art. 54). These States may also adopt laws and regulations with respect to fishing vessels, and the prevention of fishing, including the stowage of fishing gear (arts. 42 and 54).

192. In the exclusive economic zone, which lies beyond and adjacent to the territorial sea up to 200 miles from the baselines, the coastal State enjoys sovereign rights for the purpose of exploring, exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil. In particular, the coastal State is required to determine the total allowable catch of the living resources (art. 61), and ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation. In taking such measures, the coastal State must take into consideration the effects on species associated with or dependent upon harvested species (ibid., para. 4). The coastal State must also promote the optimum utilization of the living resources (art. 62), and has the right to prohibit, limit or regulate the exploitation of marine mammals (art. 65) and the obligation to ensure the conservation of anadromous stocks (art. 66). The rights and obligations of States related to straddling and highly migratory fish stocks, beyond areas under national jurisdiction and, in some respects, within these areas, are developed in the United Nations Fish Stocks Agreement.

193. Finally, the coastal State also exercises sovereign rights for the purpose of exploring the continental shelf and exploiting its natural resources (art. 77). The

continental shelf comprises the seabed and subsoil that extend beyond the territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines where the outer edge of the continental margin does not extend up to that distance. In cases where the outer edge of the continental margin extends beyond 200 nautical miles, the sovereign rights of the coastal State over the natural resources continue up to the limits set out in article 76 (art. 76). The natural resources of the continental shelf consist of the mineral and non-living resources of the seabed and subsoil as well as the living organisms belonging to sedentary species, that is to say, organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil (art. 77). No one may explore the continental shelf or exploit its resources without the express consent of the coastal State. The extent to which the definition of sedentary species under article 77 covers the complex and symbiotic web of life of deep-sea ecosystems may need to be addressed in order to clarify whether such ecosystems and organisms belong to the regime of the continental shelf or of the water column above it. The issue is important since, beyond the 200 nautical mile limit, or within that limit in cases where an exclusive economic zone has not been declared, while the coastal State has sovereign rights over biological resources belonging to sedentary species on the continental shelf, such as sponge and corals, other biological resources are subject to the regime of the high seas.

194. *Convention on Biological Diversity*. The Convention is to be applied consistently with the rights and obligations of States under the law of the sea (art. 22). Of particular relevance to the conservation and sustainable use of marine genetic resources, are its provisions related to the jurisdictional scope (art. 4), in situ conservation (art. 8),[165] ex-situ conservation (art. 9),[166] sustainable use (art. 10), incentive measures (art. 11), impact assessment and minimizing adverse impacts (art. 14), access to genetic resources (art. 15), access to and transfer of technology (art. 16), and handling of biotechnology (art. 19).

195. It results from these provisions, as applied to marine genetic resources, that, among others, access to marine genetic resources under national jurisdiction rests with the coastal State and, where granted, shall be on mutually agreed terms and subject to the prior informed consent of the coastal State (art. 15, paras. 1, 4 and 5). Coastal States parties to the Convention must therefore endeavour to create conditions to facilitate access to genetic resources for environmentally sound uses by other parties (ibid., para. 2). Parties are also required to take measures to share, in a fair and equitable way, the benefits arising from a commercial and other utilization of genetic resources (ibid., para. [illegible]). These provisions relate to access to genetic resources both in situ and ex situ. The Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising Out of their Utilization, adopted by the sixth meeting of the Conference of the Parties in 2002, elaborate on the provisions of article 15, including by detailing possible

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[165] Article 2 defines in-situ conservation as "the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties".

[166] Article 2 defines ex-situ conservation as "the conservation of components of biological diversity outside their natural habitats".

elements for a prior informed consent and types of benefit-sharing arrangements.[167] The website of the Convention provides a database of measures in place at the national and regional level on access to genetic resources and benefit-sharing arrangements.[168] Discussions are ongoing, within the framework of the Convention, for the development of an international regime on access and benefit-sharing.[169] The issue of whether such a regime should also apply to products and derivatives of genetic resources has been and continues to be discussed.[170]

(b) Marine genetic resources beyond national jurisdiction

196. Areas beyond national jurisdiction include: the high seas, which are all areas of the water column that are not included in the exclusive economic zone, the territorial sea or the internal waters of a State, or in the archipelagic waters of an archipelagic State (UNCLOS, article 86); and the Area, defined as the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction (art. 1, para. 1 (1)).

197. *UNCLOS*. States have exclusive jurisdiction over ships flying their flag on the high seas (art. 92). Under Part VII of UNCLOS, the high seas are open to all States. Freedom of the high seas must be exercised under the conditions laid down by UNCLOS and by other rules of international law (art. 87). Freedom of fishing, for example, is specifically subject to the conditions laid down in section 2, and freedom of scientific research is specifically subject to Parts VI and XIII. Freedom of the high seas must also be exercised by all States with due regard for other States' interests in their exercise of the freedom of the high seas (art. 87). In particular, the right to engage in fishing on the high seas is subject to the rights and duties, as well as the interests of coastal States (art. 116, para. (b)). States have the duty to take, or to cooperate with other States in taking, such measures as may be necessary for the conservation of the living resources of the high seas (art. 117), and shall cooperate with each other in the conservation and management of living resources in the high seas (art. 118). The United Nations Fish Stocks Agreement elaborates on the duty of cooperation.

198. Part XI of UNCLOS and the Part XI Agreement provide the legal regime for the Area. The Area and its resources, defined for the purposes of Part XI as "all solid, liquid and gaseous mineral resources in situ in the Area at or beneath the seabed, including polymetallic nodules" (UNCLOS, art. 133), are the common heritage of mankind (art. 136). Activities in the Area, which are "all activities of exploration for, and exploitation of, the resources of the Area" (art. 1, para.1 (3)) must be carried out for the benefit of mankind as a whole, and the International Seabed Authority, the organization through which States organize and control all activities in the Area, must provide for the equitable sharing of financial and other economic benefits derived from such activities (art. 140). The Authority must also

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[167] Secretariat to the Convention on Biological Diversity (2002). "Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of Their Utilization", annex to decision VI/24 "Access and benefit-sharing as related to genetic resources", UNEP/CBD/COP/6/20.

[168] The database is available at http://www.biodiv.org/programmes/socio-eco/benefit/measures.aspx.

[169] See http://www.biodiv.org/programmes/socio-eco/benefit/regime.aspx.

[170] See, for example, decision VIII/4 on access and benefit-sharing, of the Conference of the Parties to the Convention, UNEP/CBD/COP/8/31, annex 1.

adopt appropriate rules, regulations and procedures for, inter alia, the protection and conservation of the natural resources of the Area (art. 145).

199. Under article 137 of UNCLOS, no State shall claim or exercise sovereignty or sovereign rights over any part of the Area or its resources, nor shall any State or natural or juridical person appropriate any part thereof. No such claim or exercise of sovereignty or sovereign rights nor such appropriation shall be recognized. All rights in the resources of the Area, as defined in article 133 of UNCLOS, are vested in mankind as a whole, on whose behalf the Authority shall act, and these resources are not subject to alienation.

200. Different views have been expressed, in the context of the work of the United Nations General Assembly, regarding the legal status of genetic resources found in the Area (see A/59/122 and A/61/65).

201. *Convention on Biological Diversity*. The provisions of the Convention do not apply to components of biological diversity beyond the limits of national jurisdiction. In these areas, the Convention only applies to processes and activities carried out under the jurisdiction or control of States (art. 4). The provisions of the Convention therefore do not apply to genetic resources beyond national jurisdiction. In accordance with article 5, parties are required to cooperate directly, or through competent international organizations, in respect of areas beyond national jurisdiction, for the conservation and sustainable use of biological diversity (see also A/59/62/Add.1, paras. 254-260).

202. *CITES*. This Convention, which aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival, through the regulation of such trade and a listing system, is relevant to the issue of marine genetic resources insofar as it defines trade to mean export, re-export and import, as well as "introduction from the sea." The latter term is defined as "transportation into a State of specimens of any species which were taken in the marine environment not under the jurisdiction of any State". Specimens are any readily recognizable part of an animal or plant or derivatives thereof (article I); this may include raw material, such as shell, and processed items, such as medicine.[171] The introduction from the sea of any specimen of a species requires the prior grant of a certificate from a Management Authority of the State of introduction, which shall be granted provided a number of conditions are met, including that the introduction will not be detrimental to the survival of the species and, in the case of species listed on Appendix I, that the proposed recipient of a living specimen is suitably equipped to house and care for it and the specimen is not to be used for primarily commercial purposes (art. III, para. 5; art. IV, para. 6). Several species of coral, cetaceans and fish are listed on CITES Appendices.

2. Marine scientific research

203. UNCLOS provides the legal regime for the conduct of marine scientific research, without defining the term. In the absence of a formal definition, it has been suggested that marine scientific research under UNCLOS encompasses both the study of the marine environment and its resources with a view to increasing humankind's knowledge (so-called "pure" or "fundamental" research), and research for the subsequent exploitation of resources (so-called "applied" research) (see

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[171] See the CITES Glossary at http://www.cites.org/eng/resources/terms/glossary.shtml.

A/59/122 and A/61/65). Previous reports of the Secretary-General have highlighted the practical difficulty in differentiating between the two types of research, in particular in the context of increasing partnerships between public research institutions and industry (see A/60/63/Add.1, paras. 202-208). It is worth noting that under UNCLOS and the Regulations on Prospecting and Exploration for Polymetallic Nodules adopted by the International Seabed Authority a distinction is made between marine scientific research and prospecting in relation to mineral resources of the Area.[172]

(a) General principles for the conduct of marine scientific research

204. *UNCLOS*. Marine scientific research in all maritime areas is to be carried out in accordance with the provisions and general principles of part XIII of UNCLOS.

205. All States, irrespective of their geographical location, and competent international organizations have the right to conduct marine scientific research subject to the rights and duties of other States as provided for in UNCLOS (art. 238). The development and conduct of marine scientific research are to be promoted and facilitated (art. 239). Marine scientific research must be conducted exclusively for peaceful purposes, with appropriate scientific methods and means compatible with UNCLOS, and in compliance with all relevant regulations adopted in conformity with UNCLOS, including those for the protection and preservation of the marine environment (art. 240). In addition, marine scientific research shall not unjustifiably interfere with other legitimate uses of the sea and shall be duly respected in the course of such uses (ibid., para. c). Marine scientific research shall not constitute the legal basis for any claim to any part of the marine environment or its resources (art. 241).

206. States and competent international organizations are required to promote international cooperation in marine scientific research for peaceful purposes (art. 242). They are also required to cooperate, through bilateral and multilateral agreements, to create favourable conditions for the conduct of marine scientific research in the marine environment and to integrate the efforts of scientists in studying the essence of phenomena and processes occurring in the marine environment and the interrelations between them (art. 243).

207. In accordance with UNCLOS, States are required to make available by publication and dissemination through appropriate channels information on proposed major programmes and their objectives as well as knowledge resulting from marine scientific research. For this purpose, the flow of scientific data and information and the transfer of knowledge resulting from marine scientific research, especially to developing States, shall actively be promoted as well as the strengthening of the autonomous marine scientific research capabilities of developing States through, inter alia, programmes to provide adequate education and training of their technical and scientific personnel (art. 244). Part XIV of UNCLOS provides for the general principles that apply to the development and transfer of marine technology.

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[172] Regulations on Prospecting and Exploration for Polymetallic Nodules (ISBA/6/A/18, 4 October 2000). Prospecting is defined as "the search for deposits of polymetallic nodules in the Area, including estimation of the composition, size and distributions of polymetallic nodule deposits and their economic values, without any exclusive rights".

208. These provisions reflect the role of scientific knowledge in the economic and social advancement of societies. Difficulties may arise, however, from their application to bioprospecting activities, which usually entail the assertion of intellectual property rights over data and samples resulting from the research (see also paras. 219-228 below).

209. *Convention on Biological Diversity*. Although not expressly referring to marine scientific research, the Convention generally requires its parties to promote and encourage research which contributes to the conservation and the sustainable use of biological diversity and to promote and cooperate in the use of scientific advances in biological diversity research in developing methods for the conservation and sustainable use of biological resources (art. 12). Parties must provide and/or facilitate access to, and transfer of, technologies, including biotechnology, that are relevant to the conservation and sustainable use of biodiversity or make use of genetic resources (art. 16). Parties must also facilitate the exchange of information, from all publicly available sources, relevant to the conservation and sustainable use of biological diversity, taking into account the special needs of developing countries, including the results of technical, scientific and socio-economic research (art. 17). The establishment of joint research programmes and joint ventures for the development of technologies relevant to the objectives of the Convention should also be promoted (art. 18).

(b) Marine scientific research under national jurisdiction

210. *UNCLOS*. The coastal State has the right to regulate, authorize and conduct marine scientific research in the territorial sea, the exclusive economic zone and the continental shelf. Marine scientific research conducted by other States and international organizations in these maritime areas is subject to the consent of the coastal State (arts. 245 and 246). Such consent is expected to be granted, in normal circumstances, for marine scientific research activities which is to be carried out exclusively for peaceful purposes and in order to increase scientific knowledge of the marine environment for the benefit of all mankind. States and international organizations that undertake marine scientific research in areas under the national jurisdiction of a coastal State have a duty to provide information to that coastal State and the duty to comply with the obligations established under articles 248 and 249, such as the representation of the coastal State on board the research vessel or its participation in the marine scientific research project, and access to all data and samples derived from the marine scientific research project (art. 249, paras. 1 (b) and (c)). Communications concerning marine scientific research projects shall be made through appropriate official channels, unless otherwise agreed (art. 250).

211. The coastal State may withhold its consent in some cases, including if the research is of direct significance for the exploration and exploitation of natural resources, whether living or non-living (art. 246, para. 5). UNCLOS further provides that, notwithstanding paragraph 5 of article 246, the coastal States may not exercise its discretion to withhold consent in respect of marine scientific research projects on the continental shelf, beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured, outside those specific areas which it may at any time publicly designate as areas in which exploitation or detailed exploratory operations focused on those areas are occurring or will occur within a reasonable period of time (ibid., para. 6). The coastal State may also require its prior agreement for making internationally available the research results of a

project of direct significance for the exploration and exploitation of its natural resources (art. 249, para. 2).

212. UNCLOS also provides for the right to require the suspension or the cessation of marine scientific research activities (art. 253). For example, a coastal State may require cessation of such activities when non-compliance with the provisions of article 248 amounts to a major change in the research project or the research activities (ibid., para. 2).

213. *Convention on Biological Diversity*. Under the Convention, parties shall endeavour to develop and carry out scientific research based on genetic resources provided by other parties with the full participation of, and where possible in, such parties (art. 15, para. 6). Parties are also required to share in a fair and equitable way the results of research and development, upon mutually agreed terms (ibid., para. 7), and to provide for the effective participation in biotechnological research activities by those Contracting Parties, especially developing countries, which provide the genetic resources for such research (art. 19).

214. Marine scientific research is often a means of accessing marine genetic resources. In this regard, subject to article 311 of UNCLOS, which defines the relation between UNCLOS and other conventions and international agreements, the rules and procedures related to the consent for marine scientific research under UNCLOS, as outlined above, and the conditions for access to genetic resources established by States pursuant to article 15 of the Convention on Biological Diversity (see paras. 194-195 above) could be complementary. An academic review of clearance procedures for marine scientific research has shown that there was limited information on how States have integrated the provisions of the Convention on Biological Diversity in clearance procedures for marine scientific research.[173]

(c) Marine scientific research beyond national jurisdiction

215. *UNCLOS*. All States, irrespective of their geographical location, and competent international organizations have the right to conduct marine scientific research in the water column beyond the limits of the exclusive economic zone (art. 257) and in the Area (art. 256).

216. Marine scientific research in the Area shall be carried out exclusively for peaceful purposes and for the benefit of mankind as a whole (art. 143). The Authority may carry out marine scientific research concerning the Area and its resources and may enter into contracts for that purpose, shall promote and encourage the conduct of marine scientific research in the Area, and shall coordinate and disseminate the results of such research and analysis when available (ibid., para. 2). States parties which carry out marine scientific research in the Area must promote international cooperation in marine scientific research, including by ensuring that programmes are developed through the Authority or other international organizations as appropriate for the benefit of developing States and technologically less developed States with a view to, inter alia, training their personnel and the personnel of the Authority in the techniques and applications of research (ibid., para. 3 (b)), and by effectively disseminating the results of research and analysis,

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[173] M. Gorina-Ysern, *An International Regime for Marine Scientific Research* (Transnational Publishers, 2003).

when available, through the Authority or other international channels when appropriate (ibid., para. 3 (c)).

217. *Convention on Biological Diversity*. Beyond the limits of national jurisdiction, the Convention applies to processes and activities carried out under the jurisdiction or control of States. Such processes and activities include marine scientific research. Relevant provisions in this regard relate to the identification and monitoring of processes and activities which have or are likely to have a significant adverse impact (art. 7 (c)), and environmental impact assessment and minimization of adverse impact (art. 14).

218. *CITES*. The provisions of CITES on introduction from the sea (see para. 202 above) do not apply to the non-commercial loan, donation or exchange between scientists or scientific institutions registered by a Management Authority of their State (art. VII, para. 6).

3. Other relevant aspects

(a) Assertion of intellectual property rights

219. A number of mechanisms are available to scientists to protect and reward the outcomes of their intellectual efforts, including patents and copyrights. Patents are more directly relevant to activities related to marine genetic resources and are therefore the focus of this section.

220. It is important to note that intellectual property rights instruments do not refer specifically to genetic resources. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO) refers to "micro-organisms" and "microbiological processes" without defining the terms (art. 27). The Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure, which also refers to micro-organisms, does not define the term either. In practice, a wide range of categories of material have been accepted as micro-organisms, including biological and genetic material derived from macro-organisms, such as tissue cultures and plasmids, as well as viruses, undifferentiated human, animal or plant cells, and protozoa.[174] A report on trends in patent activity notes that in the context of the expansion of patent activity in the realm of biotechnology, the categories of the International Patent Classification system that relate to micro-organisms and enzymes seem to have been converted into "catch-all" categories for a wide range of biological and genetic material.[108]

221. Patents confer upon their holders more or less extensive rights in exchange for publication of information on their invention, including the right to exclude others from "making, using, offering for sale, or selling" or "importing" the protected invention into a jurisdiction where the patent protection is in force, or to charge others for any uses or purposes involving the protected invention within such jurisdictions (i.e., through licensing). In order for a patent to be awarded, inventions must meet three criteria, they must be: new (or novel); involve an inventive step (be non-obvious); and be capable of industrial application (be useful or of utility). The novelty test requires the applicant to show that the invention has some new

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[174] P. Oldham, *Global Status and Trends in Intellectual Property Claims: Microorganisms*, Centre for Economic and Social Aspects of Genomics (2004), Lancaster University.

characteristic that is not known in the body of existing knowledge in its technical field. The novelty of an invention may be undermined for patent purposes if it is described in published form or put to public use prior to the application for patent protection. The inventive test requires the invention to exhibit an inventive step that could not be deduced by a person with average knowledge of the technical field. The industrial applicability test requires that the invention be of practical use, or capable of some kind of industrial application. An additional criterion is that of patentability of the subject-matter as defined by national law.[175]

222. The rise of patent protection in the field of life sciences has raised questions and concerns, including whether naturally occurring organisms and substances isolated from their natural surroundings are inventions or discoveries, whether they meet the criteria for industrial application, whether the extension of patent protection to genetic material is justifiable on ethical grounds, and the impacts of permitting patent claims that are very broad in scope.[176] It has been noted that the patent system does not grant ownership in the traditional sense but rather the exclusive use, by the patent holder, of that naturally occurring material or the products derived thereof for a limited period of time, usually 20 years.[177] A study by the Organization for Economic Cooperation and Development (OECD) notes that gene-related inventions, including micro-organisms in their original state, are both legally patentable and increasingly patented in many OECD countries.[178] A report by the Indian Patent Facilitating Centre shows that most developing countries do not allow patenting of micro-organisms in their original state.[179] Work is ongoing in the context of the World Intellectual Property Organization (WIPO) on this issue (see para. 239 below).

223. *TRIPS Agreement*. The TRIPS Agreement provides minimum standards of intellectual property protection and aims, among others, to promote effective and adequate protection of intellectual property rights as well as to ensure that measures and procedures to enforce intellectual property rights do not become barriers to legitimate trade. Article 7 of the TRIPS Agreement sets out as one of its objectives that the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare.

224. Member States are required to make patents available for inventions that are new, involve an inventive step and are capable of industrial application (art. 27, para. 1). Members may exclude from patentability plants and animals other than micro-organisms and essential biological processes for the production of plants or animals other than non-biological and microbiological processes (ibid., para. 3 (b)).

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[175] World Intellectual Property Organization, *Understanding Industrial Property*, Publication No.895(E), available at http://wipo.int.freepublications/.

[176] P. Oldham, "Global status and trends in intellectual property claims: genomics, proteomics and biotechnology" (2004, reproduced in document UNEP/CBD/WG-ABS/3/INF/4), available at www.biodiv.org.

[177] World Trade Organization, "The Relationship between the TRIPS Agreement and the Convention on Biological Diversity, Summary of Issues Raised and Points Made", IP/C/W/368/Rev.1 and Corr.1.

[178] Organization for Economic Cooperation and Development, 2002, Paris. *Genetic Inventions, Intellectual Property Rights and Licensing Practices: Evidence and Policies*.

[179] Indian Patent Facilitating Centre (2006), *Patenting of Microorganisms*.

The exclusive rights conferred by a patent related to a product are those of making, using, offering for sale, selling, or importing for these purposes the product that is the subject matter of the patent. Patents for processes must grant exclusive rights not only over use of the process but also over the use, offering for sale, selling or import for those purposes of the products obtained directly from the process. Patent owners have the right to assign, or transfer by succession, the patent and to conclude licensing contracts (art. 28). Finally, applicants for a patent have to disclose the invention in a manner sufficiently clear and complete for the invention to be carried out by a person skilled in the art and may be required to indicate the best mode for carrying out the invention known to the inventor at the filing date or, where priority is claimed, at the priority date of the application (art. 29).

225. *Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure*. Where an invention involves a micro-organism or the use of a micro-organism, disclosure of the invention is not always possible in writing or may not be sufficient to ensure that a person skilled in the art could reproduce it, due to various factors such as mutation of the strain. Parties to the Budapest Treaty recognize a deposit made in specified culture collections, or International Depositary Authorities, as adequate for the purposes of the disclosure requirement of their patent procedure. The deposit assures access to the micro-organism by persons other than the inventor for the purposes of testing or experimenting or for commercial use when the patent expires. Member States must recognize the deposit of a micro-organism with any international depositary authority, irrespective of its location.

226. *Other relevant instruments*. Other relevant instruments include the Patent Cooperation Treaty, which addresses international patent applications, and the Patent Law Treaty, which aims at harmonizing and streamlining formal procedures in respect of national and regional patent applications and patents (see A/60/63/Add.1, paras. 218-219).

227. *UNCLOS and patents related to marine genetic resources*. The assertion of intellectual property rights over marine genetic resources raises a number of questions in light of the provisions of UNCLOS related to marine scientific research, in particular whether filing a patent application is considered as a claim to part of the marine environment or its resources; whether the rights conferred by a patent are likely to interfere with the right to carry out marine scientific research; and whether the degree of confidentiality required prior to the filing for patents in order to safeguard the novel character of an invention is compatible with the requirement for dissemination and publication of data and research results. Some States have recognized the freedom to carry out research in their patent laws through so-called experimental use exemptions, which allow scientists to use a patented invention, provided that the research is for non-commercial purposes. An OECD survey of the use of patented knowledge has shown that experimental use exemptions vary among States, and noted that more research is needed to ascertain whether the absence of such exemptions is having a deleterious effect on scientific inquiry.[180]

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[180] *Research Use of Patented Knowledge: A Review* (OECD Directorate for Science, Technology and Industry Working Paper 2006/2), available at www.oecd.org/.

228. It should also be noted that discussions are ongoing, in various forums, with regard to the need for and modalities of a requirement to disclose the origin of genetic resources in patent applications[181] (see paras. 239 and 244 below).

(b) Protection and preservation of the marine environment

229. In light of the symbiosis between natural resources, including marine genetic resources, and their surrounding environment, there is an inextricable link between the protection and preservation of the marine environment and activities related to marine genetic resources. The preservation of biological diversity and its components are a prerequisite for any future activity of research and bioprospecting.

230. The protection and preservation of the marine environment is addressed by the comprehensive framework set out in part XII of UNCLOS. There is a general obligation for States to protect and preserve the marine environment (art. 192), including by taking all measures necessary to prevent, reduce and control pollution of the marine environment (art. 194, para. 1). States must protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life (ibid., para. 5). States are also required to avoid the use of technologies, or the intentional or accidental introduction of alien species to a particular part of the environment, which may cause harmful changes thereto (art. 196). They are also to cooperate on a global and, as appropriate, on a regional basis, in the formulation of international rules, standards and recommended practices for the protection and preservation of the marine environment (arts. 207, para. 4; 208, para. 5; 209, para. 1; 210, para. 4; 211, para. 1; and 212, para. 3). They must also monitor the risks or effects of pollution of any activities conducted under their control, as well as assess the potential effects of planned activities on the marine environment (arts. 204 and 206). Moreover, States are required to provide scientific and technical assistance to developing States to enhance their capabilities to protect and preserve the marine environment (arts. 202 and 203).

231. In areas under national jurisdiction, the coastal State has jurisdiction with regard to the protection and preservation of the marine environment in its exclusive economic zone (art. 56, para. 1 (b) (iii)). Coastal States are specifically required to take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights (art. 194, para. 2).

232. In areas beyond national jurisdiction, in order to ensure effective protection of the marine environment from harmful effects, which may arise from activities in the Area, the Authority must adopt appropriate rules, regulations and procedures for, inter alia: the prevention, reduction and control of pollution and other hazards to the marine environment and of interference with the ecological balance of the marine environment; and the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment (art. 145). States are also required to adopt laws and regulations to prevent, reduce

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[181] See, for example, "Interrelation of access to genetic resources and disclosure requirements in applications for intellectual property rights: Report of the World Intellectual Property Organization (WIPO)", UNEP/CBD/COP/8/INF/7. See also http://www.wipo.int/tk/en/genetic/proposals/index.html.

and control pollution of the marine environment from activities undertaken by vessels, installations, structures and other devices flying their flag or of their registry or operating under their authority (art. 209).

233. The obligations set out under UNCLOS for States to protect and preserve the marine environment are complemented by a number of international instruments (see A/59/62/Add.1).

H. Present activities supporting international cooperation and coordination relating to marine genetic resources

234. The present section provides an overview of recent activities supporting international cooperation and coordination relating to marine genetic resources. Comprehensive information on relevant past activities is included in document A/60/63/Add.1 (paras. 226-304).

1. United Nations General Assembly

235. The issue of marine genetic resources was discussed at the meeting of the Ad Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biodiversity beyond areas of national jurisdiction, which convened pursuant to General Assembly resolution 59/24 of 17 November 2004 (see A/61/65).

236. The General Assembly, in paragraph 91 of resolution 61/222, requested the Secretary-General to convene a meeting of the Working Group in 2008, to consider, among others, genetic resources beyond areas of national jurisdiction.

2. United Nations programmes, specialized agencies and other organizations of the United Nations system

237. *United Nations Environment Programme*. It is expected that the regular process for global reporting and assessment of the state of the marine environment, including socio-economic aspects, in its consideration of socio-economic aspects of current and foreseeable use of marine resources, will address bioprospecting and utilization of marine genetic resources.[182] UNEP has also published a number of relevant reports that may assist discussions on marine genetic resources, including on *Ecosystems and Biodiversity in Deep Waters and High Seas*[111] (see para. 256 below).

238. *Food and Agriculture Organization of the United Nations*. Since 2006 fishery genetic resources have been addressed more fully by the Commission on Plant Genetic Resources for Food and Agriculture and FAO, which has undertaken a review of status and trends in fishery genetic resources in marine capture fisheries, the deep sea and aquaculture.[183]

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[182] Contribution from UNEP. UNEP and IOC are the lead agencies pursuant to General Assembly resolution 60/30.

[183] Contribution from FAO. See D. M. Bartley, H. Harvey, and R. S. V. Pullin (eds), Status of aquatic genetic resources and trends in their management for capture fisheries and aquaculture: a basis for international policy (FAO/CGRFA/WFT, 2007).

239. *World Intellectual Property Organization.* WIPO prepared a study on the "Interrelation of Access to Genetic Resources and Disclosure Requirements in Applications for Intellectual Property Rights",[183] which informed discussions at the eighth meeting of the Conference of the Parties to the Convention on Biological Diversity. The WIPO secretariat has established an online, publicly accessible and searchable database of biodiversity-related access and benefit-sharing contracts.[184] At its tenth meeting, the WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore requested the WIPO secretariat to also prepare a document listing options for continuing or further work in the areas of: the disclosure requirement and alternative proposals for dealing with the relationship between intellectual property and genetic resources; the interface between the patent system and genetic resources; and the intellectual property aspects of access and benefit-sharing contracts.[185]

240. *Convention on Biological Diversity.* The eighth meeting of the Conference of the Parties to the Convention on Biological Diversity, held in Curitiba, Brazil, from 20 to 31 March 2006, adopted decision VIII/21, entitled "Marine and coastal biological diversity: conservation and sustainable use of deep seabed genetic resources beyond the limits of national jurisdiction"[186] (see A/61/63/Add.1, paras. 145-148). Significant work has also been undertaken in the context of the Convention in relation to the interplay between genetic resources and intellectual property rights. In this context, a number of studies were prepared in cooperation with the WIPO (see para. 239 above). For other relevant activities of the Convention, see para. 257 below.

241. *CITES.* In accordance with decision 13.18 of the Conference of the Parties to CITES, a workshop on introduction from the sea issues was held in Geneva from 30 November to 2 December 2005.[187] The fourteenth meeting of the Conference of the Parties to CITES is expected to consider the report of the workshop and address the interpretation and implementation of the provisions of CITES related to introduction from the sea[188] (see also para. 202 above).

242. *International Seabed Authority.* In collaboration with the Seamounts Group of the Census of Marine Life, the Authority held a workshop on cobalt-rich crusts and the diversity and distribution patterns of seamount fauna, from 27 to 31 March 2006.[4] (For other relevant developments within the Authority, see also paras. 13 to 18 above.)

243. *United Nations University.* The Institute of Advanced Studies of the United Nations University (UNU-IAS) has published a report entitled *Implementing the Ecosystem Approach in Open Ocean and Deep Sea Environments: An Analysis of Stakeholders, their Interests and Existing Approaches* (see para. 256 below).

244. *World Trade Organization.* The review of article 27.3(b) of the TRIPS Agreement began in 1999 and is ongoing in the TRIPS Council. The WTO secretariat has issued a revised version of its document on "Summary of Issues

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[184] The database is accessible at http://www.wipo.int/tk/en/databases/contracts/.

[185] The draft report of the meeting is contained in document WIPO/GRTKF/IC/10/7 Prov.

[186] The report of the meeting is contained in document UNEP/CBD/COP/8/31, annex I.

[187] The report of the meeting is contained in CITES document SC54 Doc. 19.

[188] The meeting will be held from 3-15 June 2007, in The Hague, Netherlands.

Raised and Points Made."[189] A note by the WTO secretariat on the relationship between the TRIPS Agreement and the Convention on Biological Diversity was also submitted to the eighth meeting of the Conference of the Parties to the Convention.[190]

3. Other international organizations and entities

245. *Antarctic Treaty.* In recent years, the Antarctic Treaty Consultative Meeting has discussed issues arising from biological prospecting in Antarctica. The twenty-ninth Meeting, held in Edinburgh from 12 to 23 June, considered information papers on a legal regime for bioprospecting in Antarctica, Argentine activities of bioprospecting and bioremediation in Antarctica, and recent trends in biological prospecting.[191] Bioprospecting will be discussed at the thirtieth Meeting.[192]

246. *International Whaling Commission.* Of general concern to the assessment of any cetaceans is the question of stock identity. The Commission is conducting work on stock identity of whale species using genetic methods.[193]

247. *Organization for Economic Cooperation and Development.* OECD has been working on biotechnology-related topics for over 25 years, including bioeconomy, biological resources in agriculture, biosafety, intellectual property rights and scientific, industrial and health applications of biotechnology. It has produced several reports and statistics reviews in this context.[194]

248. *Secretariat of the Pacific Environment Programme.* In the context of its activities on access to genetic resources and benefit sharing, the Secretariat is planning on establishing a database of bioprospecting activities in the Pacific.[195] Furthermore, work is also ongoing, with other partners, on monitoring and management needs for bioprospecting in Pacific small island developing States.[196]

249. *Global Forum on Oceans, Coasts and Islands.* In December 2005, the Global Forum on Oceans, Coasts and Islands organized a Working Group on the high seas and deep seabed designed to facilitate multi-stakeholder dialogue prior to, at, and beyond the Third Global Conference on Oceans, Coasts, and Islands, held in Paris from 23 to 28 January 2006, and to provide input, where possible, to other forums addressing high seas and deep seabed issues. During the Third Global Conference, it was agreed that the Working Group would continue on as a "knowledge network", and also consider the need for further research and analytical work.[197]

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[189] "Review of the Provisions of Article 27.3(B) Summary of Issues Raised and Points Made", Note by the Secretariat, Revision, document IP/C/W/369/Rev.1.

[190] "The Relationship Between the TRIPS Agreement and the Convention on Biological Diversity — Summary of Issues Raised and Points Made — Submission by the WTO Secretariat", document UNEP/CBD/COP/8/INF/37.

[191] The information papers (IP13, IP112, IP116) are available at http://www.ats.aq/29atcm/buscador.php.

[192] See Final Report of the Twenty-ninth Antarctic Treaty Consultative Meeting.

[193] Contribution of the International Whaling Commission to the present report.

[194] See http://www.oecd.org/topic/0,2686,en_2649_37437_1_1_1_1_37437,00.html.

[195] Contribution from the Secretariat of the Pacific Environment Programme to the present report.

[196] Contribution from UNEP to the present report.

[197] For the report on the work of the Working Group, see http://www.globaloceans.org/highseas/index.html.

XI. Marine biological diversity

250. Biological diversity or "biodiversity" includes diversity within species, between species and of ecosystems.[198] Concerned by the continued loss of biological diversity and the social, economic, environmental and cultural implications of such loss, including negative impacts on the achievement of the Millennium Development Goals, and acknowledging that an unprecedented effort would be needed to achieve, by 2010, a significant reduction in the rate of loss of biological diversity, as called for at the World Summit for Sustainable Development,[199] the General Assembly, by resolution 61/203 of 20 December 2006, declared 2010 the International Year of Biodiversity. Activities organized in this context are expected to include marine biodiversity.

251. Following proposals for the establishment of an international mechanism on scientific expertise in biodiversity,[200] regional consultations on the Consultative Process Towards an International Mechanism of Scientific Expertise on Biodiversity were held in North America and Africa. Other consultations are expected to take place in Asia, Europe and South America.[201]

A. Diversity of marine ecosystems

252. *Wetlands.* To date, of the 1,634 Wetlands of International Importance ("Ramsar sites"), 717 sites (covering 48.5 million hectares) include coastal and marine wetland types. Sixty-two of these sites, covering approximately 10 million hectares, include coral reefs (see also para. 255 below).

253. In the context of their joint workplans, the fourth of which covers the period 2007-2009, cooperative activities between the Secretariat of the Ramsar Convention and the Secretariat of the Convention on Biological Diversity related to marine and coastal biodiversity are focusing on marine and coastal protected areas, development of guidance on integrated marine and coastal area management, and methodologies for the rapid assessment of marine and coastal biodiversity.[202]

254. *Island ecosystems.* Over half of the tropical marine biodiversity is found in islands, as well as most of the centres of endemism. Seven of the ten coral-reef hotspots surround islands.[203] In recognition of the significance of island marine biodiversity, States and other entities of the Micronesia region have joined together to pledge to protect 30 per cent of their nearshore marine ecosystems by 2020. The commitment, also known as "The Micronesia Challenge", was formally announced at the eighth meeting of the Conference of the Parties to the Convention on Biological Diversity. A Micronesia Challenge Action Planning Meeting was held

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[198] Convention on Biological Diversity, article 2.

[199] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex.

[200] The outcome of the International Conference on Biodiversity: Science and Governance, held in Paris, from 24-28 January 2005, is available at http://www.iisd/ca/sd/icb/.

[201] See http://www.imoseb.net.

[202] Contribution of the Secretariat of the Ramsar Convention.

[203] See annex to decision VIII/1 of the Conference of the Parties to the Convention on Biological Diversity, document UNEP/CBD/COP/8/31, annex I.

from 4 to 7 December 2006, in Palau, to discuss policy and technical issues related to the implementation of the Challenge.[204]

255. *Coral reefs.* The General Meeting of the International Coral Reef Initiative was held in Cozumel, Mexico, on 22 and 23 October 2006. The Meeting designated 2008 as the International Year of the Reef.[205] It also welcomed the outcome of the Third Meeting of the International Tropical Marine Ecosystems Management Symposium,[206] held in Cozumel from 15 to 20 October 2006, and, as a follow-up to the recommendations of that Symposium, agreed to undertake a number of actions and identified areas for further consideration and discussion in relation to, inter alia, resilience building in coral reef management, the promotion of sustainable tourism, strategies to engage local communities, enforcement, integration of ecosystem-based management and fisheries management, and economic valuation of coral reefs and related ecosystems. The General Meeting further adopted a decision on socio-economic monitoring which requests Initiative partners to include socio-economic monitoring in all projects and activities on coral reefs.

256. *Deep and open ocean ecosystems.* A number of reports related to deep and open ocean ecosystems have been published during the reporting period, including on: "Ecosystems and Biodiversity in Deep Waters and High Seas",[111] which provides information on recent discoveries regarding life in these ecosystems, and explores, among others, the impacts of actual and potential human activities; and "Implementing the Ecosystem Approach in Open Ocean and Deep Sea Environments: An Analysis of Stakeholders, their Interests and Existing Approaches", which provides a preliminary survey of stakeholders' interests in these areas (see para. 243 above).

257. In response to decision VIII/21 of the Conference of the Parties to the Convention on Biological Diversity,[186] the secretariat of the Convention on Biological Diversity has made available on its website preliminary information on research activities related to open ocean and deep sea environments.[207] Work on biogeographic classification systems in deep and open oceans is also ongoing.[208]

B. Diversity between and among marine species

258. *Marine migratory species and small cetaceans.* A joint report by UNEP and the Convention on Migratory Species of Wild Animals, *Migratory Species and Climate Change: Impacts of a Changing Environment on Wild Animals*[209] indicates that climate change has and will increasingly have impacts on migratory species,

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[204] See http://www.palau.biodiv-chm.org.

[205] The summary record of the Meeting is available at http://www.icriforum.org.

[206] The Action Statement and other outcome documents are available at http://www.itmems.org/index.htm.

[207] See http://www.biodiv.org/programmes/areas/marine/research.shtml.

[208] A Scientific Experts' Workshop on Biogeographic Classification Systems in Open Ocean and Deep Seabed Areas Beyond National Jurisdiction, co-sponsored by the National University of Mexico, Mexico's National Commission for the Knowledge and Use of Biodiversity, IOC, the UNESCO's Division on Ecological and Earth Sciences and IUCN-The World Conservation Union and with the financial support of the Governments of Australia, Canada and the JM Kaplan Fund, was held in Mexico City, from 22-24 January 2007.

[209] UNEP Convention on Migratory Species of Wild Animals, November 2006, available at http://www.cms.int/publications/pdf/CMS_ClimateChange.pdf.

including marine species. The report documents, among others, changes in the length, timing and location of migration routes, habitat changes, incidence of diseases, and reduced breeding success.

259. A memorandum of understanding related to the Mediterranean Monk seal (*Monachus monachus*), which is listed on Convention on Migratory Species of Wild Animals appendix I, is being established under the auspices of the Convention between four concerned range States, namely Mauritania, Morocco, Portugal and Spain.[210]

260. Following requests by the Conference of the Parties to the Convention and under the leadership of the Governments of Australia and Thailand, a memorandum of understanding and Conservation and Management Plan for the Dugong is expected to open for signature in the third quarter of 2007. The Dugong is listed on appendix II of the Convention.[211]

261. In the context of the Year of the Dolphin, launched by the Convention on Migratory Species of Wild Animals, with the secretariats of the Agreement on the Conservation of Cetaceans of the Baltic Sea, Mediterranean Sea and Contiguous Atlantic Area and the Agreement on the Conservation of Small Cetaceans of the Baltic and the North Seas, a meeting will be organized in 2007 to negotiate an agreement for the conservation of marine mammals in West African waters of the Eastern Atlantic.[212]

262. A memorandum of understanding for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region, developed under the auspices of the Convention on Migratory Species of Wild Animals, was opened for signature and entered into effect on 15 September 2006.[213] Developments under the Conservation of Cetaceans agreements mentioned in paragraph 261 above will be included in the addendum to the present report.

263. *Endangered species*. A number of species, the international trade of which is regulated under CITES, are also commercially exploited aquatic species and their management falls within the purview of FAO. Pursuant to a memorandum of understanding signed on 3 October 2006, CITES and FAO will consult on the scientific, legal and technical evaluation of commercially exploited aquatic species listed or proposed for listing on the CITES appendices. CITES and FAO have already engaged in cooperative activities in respect of the wild conch, giant clams, sturgeon and humphead wrasse, as well as species considered for CITES listing, such as several shark species.

264. Following the decision of the Standing Committee of CITES at its fifty-fourth meeting, convened from 2 to 6 October 2006, to withdraw its recommendation on the suspension of trade in four Caspian Sea sturgeon species, the CITES secretariat published the export quotas for caviar and other sturgeon products from the Caspian

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[210] Contribution from UNEP/Convention on Migratory Species of Wild Animals. The Mediterranean Monk seal is considered Critically Endangered under the IUCN Red List of Threatened Species (http://www.iucnredlist.org/).

[211] Contribution from UNEP/Convention on Migratory Species of Wild Animals to the present report.

[212] See Convention press release at http://www.cms.int/news/PRESS/nwPR2006/Year_of_the_Dolphin.pdf.

[213] See joint press release at http://www.cms.int/news/PRESS/nwPR2006/sprep17_prE_sep06.pdf.

Sea for 2007, which reflect bordering State's agreement to reduce the combined catch quotas for the Sea's six sturgeon species by an average of 20 per cent compared with 2005.[214]

265. *Discovered species.* During the reporting period, several marine species were discovered. For example, numerous discoveries of marine organisms were achieved by the Census of Marine Life in 2006. These include life forms around 407°C fluids spewing from a seafloor vent (the hottest ever discovered), new deep sea bacteria, and new species beneath 700 meters of Antarctic ice.[113]

XII. Protection and preservation of the marine environment and sustainable development

266. Healthy coastal and marine environments are essential to human well-being and sustainable development. Coastal and marine ecosystems provide a wide range of important habitat resources, and goods and services that are of significant direct and indirect economic and social value. However, the natural resource base of coastal areas is under growing pressure: 70 per cent of mega-cities with populations over 8 million are located on the coast; in some developing countries, as much as 90 per cent of sewage is dumped directly into the sea; half the world's coastal wetlands have disappeared. In addition, 38 per cent of the global human population lives along a narrow fringe of coastal land, which constitutes only 7.6 per cent of the Earth's total land area. Coastal degradation arising from land-based sources of pollution (some 80 percent of all marine pollution) or the physical alteration and destruction of coastal habitats produces large direct costs to the economy and to society.[215]

267. Despite heightened efforts globally, including by expanding and strengthening legal and institutional arrangements, coastal and marine ecosystems continue to deteriorate as a result of pressures from human development. A recent report on the state of the marine environment indicates that overall progress in protecting the marine environment from the effects of land-based activities has been uneven. While good progress has been made in dealing with persistent organic pollutants, radioactive substances and hydrocarbons, results are mixed in respect of heavy metals and sediment mobilization, and conditions have worsened in relation to sewage, nutrients, marine litter, and physical alteration and destruction of habitats. The report identifies four issues requiring priority: marine litter, nutrient over-enrichment, sewage and management of municipal wastewater, and physical alteration and destruction of habitats. It also highlights six emerging challenges deserving special attention, including coastal dead zones, depleted freshwater flows, downstream and near-coast freshwater wetlands, and the effects of sea level rise.[216]

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[214] See CITES press releases at http://www.cites.org/eng/news/press_release.shtml and http://www.cites.org/eng/news/press/2007/070102_caviar_quota.shtml.

[215] UNEP/GPA/IGR.2/6, Ministerial/high level segment background paper; available at http://www.gpa.unep.org.

[216] UNEP/GPA, *The State of the Marine Environment: Trends and processes*, The Hague, September 2006. IMO estimates that the average annual input of oil entering the marine environment from ships and other sea-based activities is 592,000 metric tonnes per year (MEPC 55/11/7).

A. Review of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities

268. The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) aims at preventing the degradation of the marine environment from land-based activities. It is designed to assist States in taking actions which will lead to the prevention, reduction, control and/or elimination of the degradation of the marine environment, and to its recovery, from the impacts of land-based activities. More than 60 countries are currently implementing GPA, either through specifically designed national programmes of action, or through national programme of action-related processes such as national development policies, programmes, initiatives and frameworks.[217]

269. The second session of the Intergovernmental Review Meeting on the Implementation of the Global Programme of Action was held in Beijing, from 16 to 20 October 2006, to consider progress in implementation of GPA and to identify options for strengthening its implementation. Participants considered approaches for developing and implementing national programmes of action, as well as issues related to mainstreaming GPA into national development planning, financing implementation of GPA, and strengthening legislative and institutional frameworks to further implementation of GPA. Major themes emerged for improved implementation at the national level, including the need for cross-sectoral partnerships, use of an ecosystem approach, coordination between national programmes and regional environmental efforts, and scientific basis for action through ongoing monitoring of the marine environment.[218]

270. Participants reviewed progress made in advancing GPA at the national, regional and international levels during the period 2002-2006 (see also sect. XII.G below), including integrating the programme into the international environmental agenda, establishing strategic partnerships with other international bodies, implementation at regional and national levels, and improving the UNEP/GPA Coordination Office outreach material.[219] Workshops were also held on mainstreaming implementation of GPA through partnerships. The session demonstrated that partnerships could provide flexible frameworks for addressing conflicting usage of marine and coastal resources and increasing awareness of coastal and marine issues, as well as a mechanism to increase capacity for addressing land-based sources of marine pollution and promoting new paradigms for freshwater, coastal and marine management.[220]

271. Following a high-level segment, the Second Intergovernmental Review Meeting concluded by adopting the Beijing Declaration on furthering the implementation of the Global Programme of Action.[221] This Declaration marks a new strategic direction for GPA, as it gives greater emphasis to national and local-level action, supported by calls for creating sustainable financial mechanisms,

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[217] Contribution of UNEP to the present report.

[218] For the report of the Meeting, see UNEP/GPA/IGR.2/7, para. 32, available at http://www.gpa.unep.org.

[219] "Progress in implementing the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities at the international, regional and national levels in the period 2002-2006", UNEP/GPA/IGR.2/2 and UNEP/GPA/IGR.2/7.

[220] UNEP/GPA/IGR.2/7, para. 39.

[221] Ibid., annex V.

economic valuation of goods and services, participation by local stakeholders, and integrated approaches to management, in particular, linking freshwater and coastal management.[222] The Beijing Declaration endorses the programme of work of the UNEP/GPA Coordination Office for the period 2007-2011, which will focus on promoting GPA at the international, regional, and national levels, strengthening implementation of GPA through the UNEP Regional Seas Programme (UNEP/RSP) and other regional mechanisms, and mainstreaming implementation of GPA in national development planning and budgetary mechanisms.[223]

272. The General Assembly, in its resolution 61/222, called upon States to take all appropriate measures to fulfil the commitments of the international community embodied in the Beijing Declaration. The Third Intergovernmental Review Meeting on the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities will be convened in 2011.

B. Pollution from ships

273. Shipping operations can cause pollution and be responsible for the introduction of unwanted aquatic organisms into the marine environment (see section C below). Furthermore, the use of toxic anti-fouling paints on ships' hulls can seriously harm marine life. Although they can seriously impact the marine environment, the major sources of pollution from ships are however not accidents, but routine operations and illegal discharges. The cumulative effect of deliberate discharges of oil at sea is considered significant compared with an accidental spill.[224] According to a recent study, the number of illegal oil discharges from ships in the Baltic Sea area has decreased by more than 50 per cent over the last eight years,[225] as a result of a complex set of measures to prevent illegal discharges of oil and waste that Member States have been implementing since the late 1990s.[226]

1. International Convention for the Prevention of Pollution from Ships

274. IMO has undertaken a comprehensive review of the annexes to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78): annex I (oil); annex II (noxious liquid substances (chemicals) carried in bulk); annex III (harmful substances carried by sea in packaged form); annex IV (sewage); annex V (garbage); and annex VI (air pollution).

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[222] "Key Outcomes of the Second Intergovernmental Review of the Global Programme of Action", available at http://www.gpa.unep.org/documents/igr2.

[223] Proposed 2007-2011 programme of work of the United Nations Environment Programme Global Programme of Action Coordination Office, UNEP/GPA/IGR.2/4.

[224] Interpol Project Clean Seas. Submission by Interpol to the fifty-fifth session of MEPC (9-13 October 2006), MEPC 55/14.

[225] Press release, 30 November 2006, "HELCOM achieves a 50% decrease in illegal oil discharges in the Baltic", available at http://www.helcom.fi.

[226] The main objective of the strategy is to ensure compliance with global and regional discharge regulations, eliminate illegal discharges of all wastes from all ships, and ensure environmentally sound treatment of ship-generated wastes. Any discharge of oil, or diluted mixtures containing oil in any form is currently prohibited pursuant to the international designation of the Baltic Sea as a "special area" under MARPOL 73/78.

275. *Annexes I-IV*. Annexes I, II and IV have been revised and are in force. Annex I was further amended in October 2006 in order to provide for the designation of the Southern South African waters as a special area. The amendments will enter into force on 1 March 2008, but Governments have been requested to comply with the new special area requirements on a voluntary basis before that date.[227]

276. Annex III has also been extensively revised in order to harmonize the regulations with the criteria for defining marine pollutants adopted by the United Nations Subcommittee of Experts on the Transport of Dangerous Goods, based on the United Nations Globally Harmonized System of Classification and Labelling of Chemicals. The revised annex III will enter into force in 2010.[228]

277. *Annex V*. IMO has begun developing the framework, method of work and timetable for the comprehensive review of annex V. The General Assembly in its resolution 60/30 had invited IMO, in consultation with relevant organizations and bodies, to undertake such review and to assess the effectiveness of annex V to address sea-based sources of marine debris. In its resolution 61/222, the Assembly welcomed the decision of IMO to review the annex and encouraged all relevant organizations and bodies to assist in that process (see also para. 118 above).

278. *Annex VI*. The review of annex VI and the NOx (Nitrous oxide) Technical Code is scheduled to be completed in 2007. MEPC will consider in July 2007 how, based on new technological developments, to further to reduce emissions of sulphur oxide, NOx, volatile organic compounds and particulate matter.[229] In the meantime and in order to assist States in the uniform and consistent implementation and enforcement of annex VI and the NOx Technical Code, IMO approved eight unified interpretations.[230] It also approved a standard form for the Sulpur Emissions Control Area Compliance Certificate to facilitate in particular port State control.[231]

279. As a follow-up action to IMO Assembly resolution A.963(23) on IMO Policies and Practices Related to the Reduction of Greenhouse Gas Emissions from Ships, which urged MEPC to identify and develop mechanisms to achieve the limitation or reduction of greenhouse gas emissions from international shipping and keep the matter under review, MEPC at its fifty-fifth session agreed a workplan, with a timetable, to identify and develop the required mechanisms to achieve the limitation or reduction of CO_2. The workplan provides for the further development of a CO_2 Emission Indexing Scheme; the consideration and evaluation of methodology for CO_2 emission baseline(s); and the consideration of technical, operational and market-based methods for dealing with greenhouse gas emissions.[232]

280. *Port reception facilities*. The General Assembly in its resolution 61/222 noted with appreciation the efforts of IMO in developing and approving an action plan[233] to address the inadequacy of port waste reception facilities, and urged States to cooperate in correcting the shortfall in such facilities in accordance with the action

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[227] Resolution MEPC.154(55) adopted on 13 October 2006. Argentina reserved its position in respect of the adoption of amendments. Report of the fifty-fifth session of the MEPC. See MEPC 55/23, annex 11.

[228] Resolution MEPC.156(55) adopted on 13 October 2006. Ibid., annex 13.

[229] IMO briefing 46/2006, 22 November 2006, available at http://www.imo.org.

[230] MEPC.1/Circ.540 or MEPC 55/23, annex 8.

[231] MEPC 55/23, annex 10.

[232] Ibid., annex 9.

[233] The Plan is set out in FSI 14/19, annex 11 and was approved by MEPC at its fifty-fifth session.

plan (see A/61/63/Add.1, para. 91). As regards regional arrangements for port waste reception facilities, MEPC recalled the obligation of each Party to MARPOL 73/78 to provide reception facilities and the provisions of the Guidelines for Ensuring the Adequacy of Port Reception Facilities (resolution MEPC.83(44)). MEPC decided it was not appropriate to recognize regional arrangements as satisfying the MARPOL 73/78 obligations, but rather as a means to provide reception facilities in the light of the requirements of MARPOL. States were requested to provide their views on how these regional arrangements could be better institutionalized.[234]

2. Particularly Sensitive Sea Areas

281. No sea areas were proposed for designation as particularly sensitive sea areas (PSSAs) in 2006. MEPC at its fifty-fifth session approved a PSSA Proposal Review Form,[235] which is intended to facilitate the review of a PSSA proposal by the Committee's Technical Group and ensure that it meets the requirements of the revised Guidelines for the Identification and Designation of PSSAs (A.982(14)).

282. A new mandatory ship reporting system was adopted for the Galapagos PSSA to be implemented on 1 July 2007.[236] As regards the Torres Strait, some States and the shipping industry expressed their concerns regarding the introduction by Australia and Papua New Guinea of compulsory pilotage in October 2006, contending that resolution MEPC.133(53) which designated the Strait as an "Extension of the existing Great Barrier Reef PSSA to include the Torres Strait", was recommendatory and provided no international legal basis for compulsory pilotage (see A/61/63/Add.1, paras. 95-96). MEPC agreed that resolution MEPC.133(53) was recommendatory, and many States urged Australia to bring its legislation in line with the understanding of MEPC.[237] Australia, supported by Papua New Guinea and New Zealand, explained that its Marine Notice 16/2006 clearly stated that in accordance with articles 42.2 and 44 of UNCLOS, Australian authorities will not suspend, deny, hamper or impair transit passage and will not stop, arrest or board ships that do not take on a pilot while transiting the Strait.[238] However, the owner, master/operator of the ship may be prosecuted on the next entry into an Australian port, for both ships on voyages to Australian ports and ships transiting the Torres Strait en route to other destinations. During the General Assembly's consideration of the item "Oceans and the law of the sea", many delegations underlined,[239] inter alia, that laws and regulations adopted by States bordering straits used for international navigation should be non-discriminatory and in conformity with UNCLOS. Australia stated that its measures were in conformity with UNCLOS and "necessary to facilitate safe passage through what are treacherous and narrow waterways".

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[234] Note by the Secretariat, MEPC 55/9/1. See MEPC 55/23, paras. 9.9-9.11.

[235] Argentina reserved its position. MEPC 55/23, paras. 5.21-5.23 and annex 20.

[236] Resolution MSC.229(82) in MSC 82/24, annex 21.

[237] MEPC 55/23, paras. 8.8-8.10, 8.12 and 8.15.

[238] The text of Marine Notice 16/2006 is available at www.amsa.gov.au.The statement by the delegation of Australia is contained in MEPC 55/23, annex 23.

[239] A/61/PV.68, 69, 71 and 83.

C. Control of harmful organisms and pathogens in ballast water

283. It is estimated that at least 7,000 different species are being carried in ships' ballast tanks around the world. The vast majority of these species do not survive the journey, but some may establish a reproductive population and may even become invasive, out-competing native species and multiplying into pest proportions.[240]

284. Measures to prevent the potentially devastating effects of the spread of harmful aquatic organisms carried by ships' ballast water are set out in the International Convention for the Control and Management of Ships' Ballast Water and Sediments. IMO has underlined the importance of its entry into force in order to enable it to consider the possibility of amending the deadline of 2009 by which some new ships[241] are required to meet the ballast water performance standard in regulation D-2. Although type-approved ballast water management systems would probably be available prior to the deadline, their installation on ships already contracted to be built in or after 2009, would not be feasible or only possible at excessive cost and/or delivery delay. MEPC requested legal opinions on the possibility of expediting the process of amending the Convention, or developing an exemption procedure for ships required to meet the deadline, or any other options.[242]

285. Meanwhile, IMO has continued to develop guidelines in order to assist States in the implementation of the Ballast Water Management Convention, including on the designation of areas for ballast water exchange; and sediment and ballast water reception facilities.[243] Also the Antarctic Treaty Consultative Parties adopted in 2006 Practical Guidelines for Ballast Water Exchange in the Treaty Area[244] to be used by all ships in the area, except those that are excluded from the scope of application of the Ballast Water Management Convention, in order to provide an interim Ballast Water Regional Management Plan for Antarctica until such time as ballast water treatment technologies have been developed.

D. Ocean noise

286. The concerns that ocean noise may pose a threat to the marine environment are growing, along with continuing calls by international organizations for further research, monitoring and the minimization of the risk of adverse effects of ocean noise. The General Assembly recently encouraged further studies and consideration of the impacts of ocean noise on marine living resources, and requested the Division to compile peer-reviewed scientific studies it receives from Member States and make them available on its website (see resolution 61/222, para. 107).

287. A draft preliminary overview of the impact of underwater sound encompassing both intentional and unintentional acoustic emissions was presented at a meeting of the Working Group on the Environmental Impact of Human Activities established under the framework of the Convention for the Protection of the Marine

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[240] See http://globallast.imo.org.

[241] Ships constructed in or after 2009 with a ballast water capacity of less than 5,000 cubic metres.

[242] See MEPC 55/23, sect. 2.

[243] Resolutions MEPC.151(55), MEPC.152(55) and MEPC.153(55) adopted on 13 October 2006. The other Guidelines relate to ballast water exchange design and control standards (G11) (resolution MEPC.149(55)); and design and construction to facilitate sediment control on ships (G12) (resolution MEPC.150(55)). For texts, see MEPC 55/23, annexes 1-5.

[244] Resolution 3 (2006) annex, adopted at the twenty-ninth Antarctic Treaty Consultative Meeting.

Environment of the North-East Atlantic (OSPAR Convention).[245] The draft overview concluded, inter alia, that the current knowledge of both direct and indirect impacts of underwater sounds on marine life is incomplete, and that exposure to intense sound levels has the potential to induce a range of adverse effects in marine life, including death, injury, and stranding of marine animals. The finalized overview will be submitted to the 2007 meeting of the OSPAR Commission.[246]

288. The Scientific Committee of the International Whaling Commission recommended that further research be undertaken to quantify the exposure and potential impact of noise from seismic surveys in certain areas, and their effect on important life functions of various species of cetaceans. It also recommended that member Governments permitting seismic surveys, inter alia: implement recommended monitoring programmes; develop and/or evaluate nationally relevant mitigation procedures; and identify and facilitate research monitoring, and mitigation procedures that address recommendations detailed in its report.[247]

E. Waste management

1. Disposal of wastes at sea

289. The Contracting Parties to the 1996 London Protocol (the Protocol) to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, 1972 (London Convention) held their first meeting in London, from 30 October to 3 November 2006,[248] in conjunction with the twenty-eighth Consultative Meeting of Contracting Parties to the London Convention. For the purpose of organizing meetings under both self-contained treaties, the Parties are regarded as "one family",[249] but, as more parties ratify the Protocol, the momentum will gradually shift away from the London Convention.[250]

290. At its first meeting and despite some divergent views, the Contracting Parties to the Protocol adopted resolution LP.1(1),[251] amending annex 1 to the Protocol to regulate sequestration of CO_2 streams from CO_2 capture processes in sub-seabed geological formations (CS-SSGF).[252] Annex 1 to the Protocol provides for wastes or other matter that may be considered for dumping. When the amendments enter into force,[253] storage of CO_2 under the seabed will be allowed under international law. While emphasizing the need to develop a low carbon form of energy, the Contracting Parties recognized that CS-SSGF is one of a portfolio of options that

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[245] The summary record of the meeting (EIHA 06/7/1-E), held from 7 to 9 November 2006, in Galway, Ireland, is available at http://www.ospar.org.

[246] The meeting will take place from 25 to 29 June 2007, in Ostend, Belgium.

[247] The Scientific Committee met from 26 May to 6 June 2006 in Saint Kitts and Nevis. The report of the Committee is contained in document IWC/58/Rep1, see www.iwcoffice.org.

[248] The 1996 Protocol entered into force on 24 March 2006.

[249] See annotations to the provisional agenda of the twenty-eighth Consultative Meeting of Contracting Parties to the London Convention; IMO document LC28/1/1, para. 3.

[250] The 1972 Convention has 81 ratifications/accessions. The 1996 Protocol has been ratified by 30 countries and replaces the London Convention for those countries.

[251] The text of the resolution LP.1(1) is contained in annex 6 of IMO document LC 28/15.

[252] See LC 28/15, para. 101.

[253] The amendments to annex 1 to the Protocol were adopted on 2 November 2006 and entered into force on 10 February 2007. See also LC 28/15, para. 103.

seek to ensure the protection of the marine environment by reducing the levels of atmospheric CO_2. In the atmosphere, elevated concentrations of CO_2, one the main greenhouse gases,[254] contribute to climate change and ocean acidification. The Parties noted that developments in technology have made it possible to capture CO_2 from industrial and energy-related sources, transport it and inject it into sub-seabed geological formation for long-term isolation from the atmosphere.[255] Some States expressed concerns that there were still too many scientific uncertainties regarding site selection, acceptable leakage rate, long-term monitoring and issues regarding the purity of the captured CO_2.[256] They suggested that specific guidelines for assessment of CS-SSGF should be developed, taking into account the endorsed Risk Assessment and Management Framework for CS-SSGF, as prepared by the Scientific Group Intercessional Technical Working Group on CO_2 Sequestration.[257]

291. The Contracting Parties adopted terms of reference for the Scientific Group to further develop specific guidelines for the assessment of CO_2 streams for disposal into sub-seabed geological formations, compatible with annex 2 to the Protocol. The terms of reference[258] reflect that CO_2 is a different substance from those typically considered for ocean disposal and that the Scientific Group should, in its guidelines, not be limited to determining an appropriate structure with respect to CO_2 sequestration. It should take into account the best available science, including the Intergovernmental Panel on Climate Change special report on *Carbon Dioxide Capture and Storage*,[259] and note the gaps in knowledge within the text of the guidelines, as appropriate. It was agreed that these specific guidelines should be ready for adoption at the second Meeting of Contracting Parties and the twenty-ninth Consultative Meeting to be held in November 2007. Following the preparation of an overview of developments regarding liability issues under multilateral environmental agreements relevant for the purpose of the London Protocol, the Parties will also explore at their next meeting, liability questions relating to CO_2 sequestration pursuant to article 15 of the Protocol.

292. Under article 18.1.2 of the Protocol, the Meeting of Contracting Parties also established a Scientific Group as a subsidiary body under the auspices of the Protocol.[260] The Group will meet concurrently with the Scientific Group under the London Convention.

2. Transboundary movement of wastes

293. In the aftermath of the incident, which occurred in Côte d'Ivoire in August 2006, where toxic waste brought by ship[261] was dumped around the city of Abidjan resulting in loss of life and serious health and environmental damage,[262] the eighth

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[254] The other main greenhouse gases are: methane, nitrous oxide, and fluorocarbons.

[255] See resolution LP.1(1).

[256] Report of the meeting, document LC 28/15, paras. 78-87.

[257] IMO document LC/SG-CO2 1/7, annex 3.

[258] See IMO document LC 28/15, annex 5.

[259] The report is available at: http://www.ipcc.ch.

[260] See LC 28/15, paras. 41-44.

[261] The "Probo Koala", a vessel tanker was chartered by "Trafigura", an independent commodity trader Group.

[262] Statement of Ms. Kuwabara-Yamamoto, Executive Secretary of the Secretariat of the Basel Convention at the opening of the eighth meeting of the Conference of Parties, held in Nairobi from 27 November to 1 December 2006, UNEP/CHW.8/16.

meeting of the Conference of the Parties to the Basel Convention on the Control of Transboundary Movement of Wastes and their Disposal sought to reinforce cooperation with the IMO on regulations on the prevention of pollution from ships (see paras. 297 and 298 below). By its decision VIII/9,[263] the Conference of the Parties invited IMO to provide information and views on: (a) the respective competencies of the Basel Convention and MARPOL 73/78 in respect of hazardous wastes and other wastes; (b) any gaps between those instruments; and (c) any options for addressing those gaps. The Basel Convention addresses cleaner production, hazardous and other wastes minimization, and control on the movement of these wastes (see also A/60/63, paras. 258).

F. Ship breaking/dismantling/recycling/scrapping

294. While the principle of ship recycling may be sound, the presence of potentially hazardous substances on board vessels delivered to recycling facilities and the reported deficient health, safety and environmental standards in many recycling facilities are a cause of serious concern. According to ILO, many workers have been killed and thousands have been injured working in often tortuous conditions.[264]

295. Among the measures that have been developed in response to some of these problems are the 2001 International Chamber of Shipping Code of Practice on Ship Recycling; the 2002 Basel Convention Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships; the 2003 IMO Guidelines on ship recycling; and the 2004 ILO Guidelines on safety and health in ship breaking for Asian countries and Turkey. Furthermore, in 2005, IMO decided to develop, as a high priority, a new instrument on ship recycling.

296. It is anticipated that the draft international convention for the safe and environmentally sound recycling of ships being developed by IMO will be completed in the 2008-2009 biennium.[265] The convention will provide regulations for the design, construction, operation and maintenance of ships and their preparation for recycling; for the operation of ship recycling facilities; and will also establish an appropriate enforcement mechanism for ship recycling, incorporating certification and reporting requirements.[266] In order to facilitate the uniform implementation of the requirements in the future convention, IMO is also developing a set of guidelines for the communication of information; ships; and recycling facilities.[267]

297. Both ILO[268] and the parties to the Basel Convention have emphasized the importance of ensuring that the new convention is developed in conformity with existing legal instruments. The eighth meeting of the Conference of Parties to the

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[263] Contribution from the Basel Convention secretariat. See also report of the eighth meeting, document UNEP/CHW.8/16.

[264] Statement by Mr. Paul Bailey of ILO during an interview on the occasion of the dispatch of the French aircraft carrier *Clemenceau*. See website of the ILO at http://www.ilo.org.

[265] The IMO Council will decide in July 2007 when to convene an international conference.

[266] Contribution of IMO to the present report. The text of the draft convention prepared by the MEPC Correspondence Group is contained in MEPC 55/3/2, annex 1.

[267] See MEPC 55/3/2, annex 2.

[268] See statement by the representative of ILO in the MEPC Correspondence Group, MEPC 55/3/2, annex 7, and at the fifty-fifth session of the MEPC, MEPC 55/23, paras. 3.34-3.36.

Basel Convention[269] emphasized in its decision VIII/11[270] that with regard to the environmentally sound dismantling of ships, IMO should ensure that the new Convention will establish a level of control equivalent to that established under the Basel Convention.

298. While both ILO and the parties to the Basel Convention have proposed to hold a third meeting of the Joint IMO/ILO/Basel Convention Working Group on ship scrapping, IMO has postponed its decision on the need for such a meeting. The Joint Working Group was established as a forum of consultation, coordination and cooperation on issues related to the work programmes and activities of the three organizations with respect to duplication of work and overlapping of roles, responsibilities and competences, as well as the identification of further needs.

G. Regional cooperation

1. Regional Seas Programme

299. UNEP/RSP continues to provide a comprehensive institutional framework for regional and global cooperation on issues relating to the coasts, oceans and seas, and to engage Governments in efforts to protect the coastal and marine environment. There are currently 18 RSPs, supported either through a regional convention or action plan.[271] In addition to supporting implementation of the work programmes of the individual RSPs, UNEP/RSP continues to support implementation of the six global Regional Seas Strategic Directions for 2004-2007, leading to a strengthened programme and a global alliance of Regional Seas Conventions and Action Plans.

300. UNEP/RSP also continues to coordinate and develop the UNEP Global Initiative on Marine Litter. In close cooperation with the secretariats of 11 regional action plans, a series of regional actions on marine litter are being developed.[272] A new global partnership devoted to this initiative was developed during the Second Intergovernmental Review Meeting. A number of countries have also taken comprehensive action to address this issue through legislation, enforcement of international agreements, reception facilities for ship-generated wastes, improved waste management practices and extensive beach clean-up.

301. The eighth Global Meeting of the Regional Seas Conventions and Action Plans, held in Beijing on 13 and 14 October 2006, focused on progress in implementing the global Regional Seas Strategic Directions, preparations for the Second Intergovernmental Review Meeting, delineation of the continental shelf, and issues related to global and regional cooperation. The meeting provided a venue to exchange experiences and best practices in addressing global conventions and programmes. A number of publications were prepared by UNEP/RSP and partners for these meetings, including publications on large marine ecosystems, implementation of GPA in the regional seas and at the regional level, and financing

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[269] The meeting took place from 27 November to 1 December 2006 in Nairobi.

[270] Contribution of the Basel Convention to the present report of the Secretary-General.

[271] Thirteen were established by UNEP and six are directly administered by it (see http://www.unep.org/regionalseas).

[272] The Baltic Sea, Black Sea, Caspian Sea, East Asian Sea, Eastern Africa, Mediterranean, Red Sea and Gulf of Aden, South Asia Seas, South East Pacific, Wider Caribbean and soon the North-East Atlantic.

implementation of regional seas conventions and action plans.[273] A UNEP/GPA report on regional assessments on the state of the environment indicates that escalating anthropogenic pressures arising from population growth and poorly managed development, as well as indiscriminate exploitation of coastal resources and inappropriate agro-forestry practices, are threatening the sustainable development of the coastal zone in all the regions. It concludes that progress over the last decade needs to be sustained and strengthened in response to growing pressures, with special attention to implementation, enforcement and environmental governance.[274]

302. *Black Sea region*. The Commission on the Protection of the Black Sea Against Pollution is working to establish common environmental objectives and assessment criteria, management targets and convergence of the European environmental policies and policies of the Black Sea coastal States. A new draft protocol on land-based sources and activities is being negotiated, which will absorb best practices from other conventions and European policies. Work also continues on monitoring and assessment, quality assurance and control, harmonized stock assessment methodologies, coordinated fish stock assessments, habitats mapping and marine protected areas (MPAs), integrated costal zone management, ecosystem recovery, and an agreement on protection and management of marine living resources.

303. The Commission also continues to perform its coordinating role in environmental decision-making in the Black Sea, consolidating knowledge and information flow on the Black Sea ecosystem and related processes, integrating the ecosystem approach in decision and policymaking, and promoting public awareness on the state and problems of the Black Sea. The first Biannual Scientific Conference "Black Sea Ecosystem 2005 and Beyond" brought together the scientific community and served as a communication tool between scientists and decision makers.

304. *East Asian Seas*. A workshop to prepare for the Second Intergovernmental Review Meeting concluded that some of the main challenges for successful implementation of GPA are weak national legislation and difficulties in achieving financial sustainability for wastewater treatment systems.[275] The proposed core actions for defining GPA implementation[276] were considered at the East Asian Seas Regional Consultation Forum, held on 19 October 2006 during the Second Intergovernmental Review Meeting. The forum highlighted the need for regional cooperation and the importance of utilizing regional organizations to address needs of the region. Representatives expressed the need for increased support in a number of areas, including financing of wastewater treatment, capacity-building for wastewater management and the implementation of ecosystem-based management and watershed management.

305. The East Asian Seas Congress, held in Haikou City, China, from 12 to 16 December 2006, was a follow-up to the 2003 East Asian Seas Congress, which

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[273] These publications are available, or will soon be available, at http://www.unep.org/regionalseas/Publications.

[274] "The State of the Marine Environment: Regional Assessments", available at http://www.gpa.unep.org.

[275] Report of the East Asian Seas IGR-2 Preparatory Workshop, 4-5 September 2006, Bangkok, Thailand.

[276] See policy brief entitled "Partnership Opportunities for Enhancing GPA Implementation in the East Asian Seas Region (2007-2011)", available at www.cobsea.org.

had endorsed the Sustainable Development Strategy for the Seas of East Asia. The Congress explored issues ranging from ocean security to innovative financial mechanisms, and featured the Ministerial Forum on the Implementation of the Strategy, and the Inaugural Meeting of the East Asian Sea Partnership Council. Eleven ministers and high-level officials from the region signed the Haikou Partnership Agreement on the Implementation of the Sustainable Development Strategy for the Seas of East Asia and accompanying Partnership Operating Arrangements. The Haikou Partnership Agreement notes that environmental problems in the East Asian seas have increased in recent years, and includes a three-year action plan on sustainable development. Signatories agreed to mobilize financial and legal resources to implement a 10-year plan aimed to ensure that at least 20 per cent of their coasts are covered by integrated coastal management programmes. The agreements will transform the Partnerships in Environmental Management for the Seas of East Asia into a regional partnership, featuring a decision-making body, a resource facility and a financial mechanism, to advance the sustainable development of the region's marine and coastal resources.[277]

306. *Eastern Africa*. Agreements were signed between UNEP/RSP and Eastern African countries to support national focus points of the States parties to the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention).[278] The initiative will establish national hubs for information exchange and a national reporting mechanism for the Convention, and give guidance on national priorities within coastal and marine management in preparation for the Convention's work programme for 2007-2009. A workshop was held to train managers and practitioners in managing MPAs using resources produced by the Western Indian Ocean Marine Biodiversity Conservation Project. The MPA Toolkit and the MPA Workbook for management effectiveness are the first of a kind adapted to a specific region, and include local experiences and case studies. Work also continued on the GEF Project on Land-based Activities in the Western Indian Ocean, and a proposal to develop a regional water and sediment quality monitoring programme was drafted by the Water, Sediment Quality Assessment and Monitoring Working Group. The Consortium for Conservation of Coastal and Marine Ecosystems in the Western Indian Ocean was initiated, which will improve coordination between non-governmental organizations working on coastal and marine environment issues.

307. *Mediterranean region*. Mediterranean countries and the European Community continue to develop cooperation to protect the marine environment and achieve sustainable development in the region based on the Barcelona Convention and related Protocols, the legal basis of the Mediterranean Action Plan (MAP). Following adoption of the Mediterranean Strategy for Sustainable Development in 2005, UNEP/MAP launched the process for its implementation through a series of activities. A programme has been devised to provide technical and financial assistance to countries in the development of national strategies for sustainable development, and work is ongoing on priority issues at the regional level, including water resource management, energy and climate change, quality agriculture and sustainable rural development, and sustainable tourism. Implementation of the

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[277] Summary report of the East Asian Seas Congress 2006, International Institute for Sustainable Development. The report of the meeting has not yet been issued.

[278] Madagascar, Mauritius, Mozambique, Seychelles and United Republic of Tanzania. Agreements were signed with Comoros and Kenya in 2005.

Mediterranean Strategy was also the focus of the eleventh meeting of the Mediterranean Commission on Sustainable Development.[279] Preparations continue for the fifteenth meeting of the Contracting Parties to the Barcelona Convention and its Protocols in November 2007, which is expected to adopt a protocol on integrated coastal zone management in the Mediterranean, and a compliance procedure.[280]

308. Work to ensure the long-term sustainable implementation of national action plans for the reduction of land-based pollution focused on the GEF Strategic Partnership, and the Euro-Mediterranean Partnership Horizon 2020 initiative to de-pollute the Mediterranean by 2020. Ministers at the Third Euro-Mediterranean Ministerial Conference adopted a timetable for the Horizon 2020 initiative and agreed to implement it through, inter alia, implementing the Barcelona Convention and its related Protocols and the Mediterranean Strategy.[281] Prior to the meeting, UNEP/MAP released a detailed report on the pollutants being discharged into the Mediterranean Sea every year from industrial activities in the region.[282] UNEP/MAP was also significantly involved in coordinating the regional response to oil pollution caused by a damaged power utility near Beirut in June 2006.[283]

309. *North-East Pacific region*. In January 2006, UNEP/RSP and GPA signed an agreement with the Central American Commission for Maritime Transport, executive secretariat of the Plan of Action, to undertake two priority activities for institutional strengthening, which will include: (i) regional programme and support to the formulation of national plans to control and reduce marine pollution from municipal wastewater, and (ii) formulation and execution of a negotiation process for the strengthening of a legal framework for the protection of the North-East Pacific against marine pollution from land-based sources and activities.

310. *North-West Pacific region*. The Regional Activity Centres of the North-West Pacific Action Plan continued work on marine and coastal environmental issues of importance to the region, including harmful algal blooms, pollutants from land-based sources, and accidental spills of oil and hazardous chemicals, and on the North-West Pacific Action Plan Marine Litter Activity initiative. The ultimate goal of the initiative is to develop a regional action plan on marine litter management. Work also continues on the State of the Marine Environment Report for the region, as well as projects involving MPAs and marine biodiversity. The eleventh North-West Pacific Action Plan Intergovernmental Meeting, held in Moscow, on 20 and 21 December 2006, agreed to carry out evaluations of the performance of the regional activity centres in 2007 to further enhance efficiency and effectiveness.

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[279] Report of the Eleventh Meeting of the Mediterranean Commission on Sustainable Development, 24-26 May 2006, Nicosia, see UNEP(DEPI)/MED WG.293/4.

[280] See the Working Document on the Draft Protocol on Integrated Management of Mediterranean Coastal Zones (UNEP(DEPI)/MED WG.298/3), the Draft Paper on a Possible Compliance Mechanism under the Barcelona Convention and its Protocols (UNEP(DEPI)/MED WG. 300/3) and recommendations from the Report of the Extraordinary Meeting of MAP Focal Points (UNEP(DEPI)/MED WG.297/8).

[281] Cairo Declaration of the Third Euro-Mediterranean Ministerial Conference on the Environment, Cairo, 20 November 2006.

[282] MAP News Release, 23 October 2006 on the report, "The Mediterranean; from assessment to actions".

[283] An Action Plan approved by the High-Level Coordination Meeting in Piraeus, Greece, will assist Lebanon with the clean-up, estimated to cost 50 million Euros (see UNEP/MAP press release, 17 August 2006, "Clean Up Strategy for Oiled Lebanese Coast Given Green Light by International Community").

311. *Pacific region.* An amended Protocol on dumping and two new Protocols on oil pollution and hazardous and noxious substances were adopted at the Conference of Plenipotentiaries to the Convention for the Protection of the Natural Resources and Environment of the South Pacific, held in Noumea, New Caledonia, 10 September 2006.[284] The subsequent meeting of the South Pacific Regional Environment Programme considered new initiatives on renewable energy, climate change adaptation, invasive species, waste management and coral reef protection, and national actions to achieve the outcomes of the 2005-2009 Action Plan for Managing the Environment of the Pacific Islands Region.[285] With the support of the UNEP/RSP, a report entitled "Pacific Island Mangroves in a Changing Climate and Rising Sea"[286] was launched, which addresses the response of mangroves to changing sea level rise, capacity-building priorities, a coastal site planning and adaptive strategy, and regional and international initiatives.

312. *Red Sea and Gulf of Aden.* The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden aims to develop a regional framework for the protection of the environment and the sustainable development of coastal and marine resources, and is working to strengthen the region's capacity to adopt and implement integrated coastal zone management plans. Workshops were held in 2006 on integrated coastal zone management plans and sustainable tourism, and on improving municipal wastewater management in coastal cities. A report was also published on financing for the environmental conservation of the region, which focuses on financing challenges facing the Regional Organization, reviews available financing mechanisms, and presents methods, tools and options to strengthen implementation at regional and national levels. In December 2006, UNEP/RSP and the Regional Organization also signed an agreement to support implementation of a national programme of action in Jordan within the context of GPA.

313. *South-East Pacific region.* A meeting on the Globallast Partnership Project, which addresses activities related to the transfer of invasive alien species through ships ballast waters in the region, was held in Guayaquil, Ecuador, on 13 and 14 February 2006. A comprehensive assessment on the impact of anthropogenic activities on marine mammals is also under way in the region, including an experts' workshop in November 2006, and work continues on a Southeast Pacific Regional Programme for the Conservation of Marine Turtles, which was presented at the thirteenth Meeting of the Conference of the Parties held in Guayaquil, Ecuador, 29-31 August 2006.

314. *Western Africa.* The secretariat for the Convention for Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (Abidjan Convention) has initiated a process to support the national focal points of States parties and signatories to the Abidjan Convention.[287] The support will establish national hubs for information exchange

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[284] See Protocol for the Prevention of Pollution of the Pacific Region by Dumping, the Protocol on Oil Pollution Preparedness, Response and Cooperation in the Pacific Region, and the Protocol on Hazardous and Noxious Substances Pollution, Preparedness, Response and Cooperation in the Pacific Region.

[285] Report on the seventeenth South Pacific Regional Environment Programme Meeting of Officials and Environment Ministers' Meeting, 11-15 September 2006, Noumea, New Caledonia.

[286] UNEP Regional Seas Reports and Studies No. 179, 2006.

[287] Benin, Cameroon, Congo, Côte d'Ivoire, Gabon, Gambia, Ghana, Guinea, Liberia, Nigeria, Senegal and Togo.

and a national reporting mechanism for the Convention, and give guidance on national priorities within coastal and marine management in preparation for the Convention's work programme for 2007-2009. UNEP has also submitted a proposal to the GEF to fund an African Small Island Developing States project on water resource management, a partnership between UNDP and UNEP, which will be implemented under the secretariats of the Nairobi Convention and the Abidjan Convention.

315. *Wider Caribbean region*. The secretariat of the Caribbean Environment Programme continues to implement the six Strategic Directions for the Regional Seas through the five-year strategy of the Caribbean Environment Programme, approved by the eleventh Intergovernmental Meeting on the Action Plan for the Caribbean Environment Programme. The twelfth Intergovernmental Meeting, held in Montego Bay, Jamaica, from 29 November to 2 December 2006, proposed to evaluate projects and activities implemented during the period 2004-2005, and review progress made in implementing the decisions of the eleventh Intergovernmental Meeting. In December 2006, the General Assembly adopted resolution 61/197 entitled "Towards the sustainable development of the Caribbean Sea for present and future generations", which calls upon the international community to assist Caribbean countries and their regional organizations in their efforts to ensure the protection of the Caribbean Sea from degradation as a result of pollution from ships, in particular through the illegal release of oil and other harmful substances, and from illegal dumping or accidental release of hazardous waste in violation of relevant international rules and standards, as well as pollution from land-based activities.

2. Antarctic

316. Belarus acceded to the Antarctic Treaty on December 27, 2006, and the Treaty now has 46 parties, 28 of which are Consultative Parties. Among other activities, the Thirtieth Antarctic Treaty Consultative Meeting, to be held in New Delhi, India in 2007, will follow up on the commitments contained in the Edinburgh Antarctic Declaration on the International Polar Year, 2007-2008. The International Polar Year is a joint initiative of WMO and the International Council for Science to provide better observation and understanding of the Earth's polar regions and to focus the world's attention on their importance.[288] It will involve thousands of scientists and over 200 projects, including studies of polar microbial ecology, bipolar climate machinery, ocean biogeochemical cycles, and ocean monitoring and forecasting, as well as projects related specifically to the Antarctic, such as the Census of Antarctic Marine Life. As scientific research during the Year will be at the intersection of disciplines, progress is also expected to be made through new observational techniques, as well as by interdisciplinary cross-analysis of databases, taking advantage of advances in computing capability and the Internet.[289]

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[288] The official observing period of the International Polar Year 2007-2008 is from 1 March 2007 until 1 March 2009. It will build on the achievements of the three previous initiatives (1882-83, 1932-33 and 1957-58).

[289] "The Scope of Science for the International Polar Year 2007-2008", WMO Publication WMO/TD-No. 1364. © 2007, available at 216.70.123.96/images/uploads/ LR*PolarBrochureScientific_IN.pdf. For additional information, see http://www.ipy.org.

3. Arctic

317. The Arctic Council has recently devoted more attention to social, economic and cultural life of the region to establish a more balanced approach to sustainable development. The Norwegian Chairmanship (2006-2008) will focus on some of the key challenges facing the Arctic region, being the need for integrated resource management, and climate change.

318. Ministers representing the eight Arctic States adopted the Salekhard Declaration at the Fifth Arctic Council Ministerial Meeting, held immediately following the meeting of Senior Arctic Officials. The Declaration[290] emphasizes the importance of circumpolar and international cooperation as being fundamental to addressing circumpolar challenges, and includes commitments on climate change, sustainable development, monitoring and assessment, conservation of flora and fauna, emergency prevention preparedness and response, and protection of the marine environment. Ministers expressed their strong support for the Year, including by promoting a circumpolar Arctic observing network of monitoring stations. The Arctic Council has three multilateral joint initiatives for the Year: the Arctic Human Health Initiative (United States), Coordination of Observation and Monitoring for Assessment and Research in the Arctic (Sweden), and Hydrometeorological Observatory in Tiksi (Russian Federation).

4. Baltic Marine Environment Protection Commission

319. The Baltic Marine Environment Protection Commission (HELCOM) has initiated new monitoring and assessments projects on eutrophication and biodiversity and nature conservation, which are designed to feed into the review process of the Baltic Sea Action Plan. Implementation of Phase I of the Baltic Sea Regional Project continues, which will introduce ecosystem-based assessments to strengthen management of Baltic Sea coastal and marine environments through regional cooperation. The First International Conference on the Assessment of Climate Change for the Baltic Sea Basin was also held in Gothenburg, Sweden, on 22 and 23 May 2006.

320. The twentieth Meeting of the Heads of Delegation of the HELCOM Member States discussed working programmes, intersessional work, and ongoing projects, as well as progress in developing the Baltic Sea Action Plan,[291] which will be adopted at a Meeting of the Environmental Ministers in November 2007. The initial draft will be unveiled at the second International Stakeholder Conference in Helsinki, on 6 March 2007. Participants will discuss top priority areas (eutrophication, pollution involving hazardous substances, maritime safety and accident response capacity, and habitat destruction and the decline in biodiversity), as well as financial aspects.[292]

321. Several meetings were held pursuant to the one-year consultation process of the European Commission on the European Marine Thematic Strategy on the Protection and Conservation of the Marine Environment and the Marine Strategy Directive, and the Commission's Green Paper on a European Maritime Policy. The

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[290] Adopted on 26 October 2006; available at http://www.arctic-council.org.

[291] Minutes of the twentieth Meeting of Heads of Delegation, 14-15 December 2006, at http://www.helcom.fi.

[292] "HELCOM to unveil draft Baltic Sea Action Plan at March Conference", press release, 26 January 2007, at http://www.helcom.fi.

Final Declaration of the European Maritime Policy Conference of the Baltic Sea Area expressly supports the proposed integrated policy approach, summarizes views and requirements of the area on a future maritime policy, such as broadening the knowledge base and protecting the marine environment, and commits to develop into Europe's maritime best practice region by 2015.[293] At the Baltic Sea and European Marine Strategy Conference, participants acknowledged the potential of the marine strategy as a way towards a sustainable future of the Baltic Sea and other regional seas, and called on authorities to fully utilize existing platforms and create appropriate mechanisms to foster cross-sectoral dialogue and actions as proposed in the European Maritime Policy and Marine Strategy.[294]

5. Commission for the Protection of the Marine Environment of the North-East Atlantic

322. At the Meeting of the Working Group on Marine Protected Areas, Species and Habitats, Portugal announced the selection of six sites around the Azores as components of the OSPAR network of MPAs. The meeting also discussed the development of ecological quality objectives for the OSPAR Maritime Area, examined nominations for the Initial OSPAR List of Threatened and/or Declining Species and Habitats, and considered strategies for monitoring the species and habitats on the list.[295] The OSPAR Commission recently announced the development of a website to allow an exchange of information on environmental impacts of offshore renewable energy, and provide a mechanism to share knowledge and experience.[296]

6. Caspian Sea

323. The Framework Convention for the Protection of the Marine Environment of the Caspian Sea (the Tehran Convention) entered into force on 12 August 2006.[297] The objective of the Convention is the protection of the Caspian environment from all sources of pollution, including the protection, preservation, restoration and sustainable and rational use of the biological resources of the Caspian Sea. It requires Contracting Parties to take all appropriate measures to prevent, reduce and control pollution of the Caspian Sea, and to use the resources of the Caspian Sea in such a way as not to cause harm to the marine environment.

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[293] Final Declaration — Opinion of the Conference of the Baltic Sea Area on the Green Paper "Towards a future Maritime Policy for the Union: A European vision for the oceans and seas", Kiel, Germany, 21 September 2006, which is available at http://www.maritimeconference2006.com.

[294] Statement of the Baltic Sea and European Marine Strategy — Linking Science and Policy Conference, Helsinki, 13-15 November 2006, available at http://www.eu2006balticsea.net.

[295] Summary record, MASH 06/9/1-E, Horta, Portugal, 2-5 October 2006, available at www.ospar.org.

[296] "Human Impacts on the Marine Environment under the Spotlight", OSPAR press release, 17 November 2006, available at www.environmentalexchange.info.

[297] Contracting Parties are: Azerbaijan, Islamic Republic of Iran, Kazakhstan, Russian Federation and Turkmenistan.

H. Marine protected areas

324. Marine protected areas in Lebanon (Palm Islands Nature Reserve) and the Philippines (four locally managed marine sanctuaries and the Taklong Island National Marine Reserve) were hit by oil spills in July and August 2006.[298] A World Heritage Site, the Jurassic Coast in the United Kingdom, was also affected by an oil spill on 23 January 2007.[299] These events highlight the threat posed by oil spills to marine protected areas and surrounding ecosystems, and the need for appropriate response planning.

325. Mapping and inventories of existing marine and coastal protected areas are under way in a number of regions, including the Black Sea and North-West Pacific.[300] Several capacity-building activities related to marine protected areas have also been conducted during the reporting period. These include training workshops organized by: the Division, in collaboration with the International Ocean Institute (IOI), for small island developing States of the Pacific region (see para. 353 below); the secretariat of the Convention on Biological Diversity, in collaboration with UNU and the International Union for the Conservation of Nature and Natural Resources (IUCN), on "The Ecosystem Approach and Customary Practice in Protected Areas in Small Islands";[301] and UNEP Regional Seas Programme, with other partners, in Africa, the Black Sea, and the Wider Caribbean.[300] A number of reports of relevance to marine protected areas have been published, including on "Review of Experience with Ecological Networks, Corridors and Buffer Zones" and "Closing the Gap. Creating Ecologically Representative Protected Area Systems."[302] A report on "Scaling Up Marine Management: the Role of Marine Protected Areas" assesses factors for MPA success, with a focus on the relation between marine protected areas and poverty.[303]

XIII. Climate change

326. The oceans are a fundamental component of the climate system, both directly impacting the climate and influenced by changes in the climate. This section presents recent developments in climate change as they relate to oceans (see paras. 289-293 above).

A. Intergovernmental Panel on Climate Change

327. The major activity of the Intergovernmental Panel on Climate Change is to prepare comprehensive and up-to-date assessments of policy-relevant scientific, technical and socio-economic information relevant for the understanding of human

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[298] IUCN press release, 25 August 2006 (www.iucn.org/en/news/archive/2006/08); BBC News, 15 August 2006 (http://news.bbc.co.uk/2/hi/asia-pacific); BBC News, 25 August 2006.

[299] BBC News, 21 January 2007 (http://news.bbc.co.uk/1/hi/uk); *Environmental News Service*, 23 January 2007 (www.ens-newswire.com/ens).

[300] Contribution of UNEP to the present report.

[301] For more information see http://www.biodiv.org/doc/meeting.aspx?mtg=WSEAPASI-01.

[302] The reports are available from the website of the secretariat of the Convention on Biological Diversity at http://www.biodiv.org.

[303] The report is available from the website of the World Bank at http://www.worldbank.org.

induced climate change, potential impacts of climate change and options for mitigation and adaptation.[304] The Panel is currently finalizing its Fourth Assessment Report, expected to be released in November 2007, which will consist of contributions from its three working groups and a synthesis report.

328. Working Group I recently released a summary of its report, "Climate Change 2007: The Physical Science Basis".[305] The Working Group I contribution describes progress in understanding of the human and natural drivers of climate change, observed climate change, climate processes and attribution, and estimates of projected future climate change. It builds upon past Panel assessments and incorporates new findings from the past six years of research.

329. The summary indicates that global atmospheric concentrations of CO_2, methane and nitrous oxide have increased markedly as a result of human activities since 1750, and now far exceed pre-industrial values spanning many thousands of years.[306] Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. Observations since 1961 show that the average temperature of the global ocean has increased to depths of at least 3,000 metres and that the ocean has been absorbing more than 80 per cent of the heat added to the climate system, which causes seawater to expand, contributing to sea level rise. Over the period 1961 to 2003, global average sea level rose at an estimated average rate of 1.8 millimetres per year, although the rate was faster over 1993 to 2003 (about 3.1 millimetres per year).[307] Numerous long-term changes in climate have been observed, including changes in Arctic temperatures and Artic sea ice and permafrost, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones (hurricanes and typhoons).[308]

330. Experts concluded, with at least 90 per cent certainty, that most of the observed increase in globally averaged temperatures since the mid-twentieth century

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[304] The Panel does not carry out research nor does it monitor data. It bases its assessment mainly on peer reviewed and published scientific/technical literature. See website at http://www.ipcc.ch/index.html.

[305] Available at http://www.ipcc.ch/. Representatives from 113 Governments adopted the Summary for Policymakers and accepting the underlying report at the Tenth Session of Working Group I, Paris, 29 January-1 February 2007. The full report of Working Group I is expected to be released in May 2007. The reports of Working Group II (impacts, adaptation and vulnerability) and Working Group III (mitigation options) will be finalized in early April and May 2007, respectively.

[306] The global atmospheric concentrations of carbon dioxide and methane have increased from pre-industrial values of about 280 parts per million and 715 parts per billion, respectively, to 379 parts per million and 1,774 parts per billion in 2005. These values exceed the natural range over the last 650,000 years as determined from ice core samples.

[307] Widespread decreases in glaciers and ice caps have contributed to sea level rise. New data show that losses from the ice sheets of Greenland and Antarctica have very likely contributed to sea level rise over 1993 to 2003.

[308] Satellite data since 1978 show that annual average Arctic sea ice extent has shrunk by an estimated 2.7 per cent per decade, with larger estimated decreases in summer of 7.4 per cent per decade. There is observational evidence for an increase of intense tropical cyclone activity (hurricanes and typhoons) in the North Atlantic since about 1970, correlated with increases of tropical sea surface temperatures.

is due to the observed increase in anthropogenic greenhouse gas concentrations. Further, that anthropogenic activity very likely contributed to a rise in average sea level. It was projected that the best estimate of globally averaged surface warming at the end of the twenty-first century, under a number of scenarios, is between 1.8°C and 4.0°C, and sea level was also projected to rise between 0.18 metres and 0.59 metres.[309] Sea ice is projected to shrink in both the Arctic and Antarctic,[310] and it is likely that future tropical cyclones will become more intense. It is also very likely that the meridional overturning circulation of the Atlantic Ocean will slow during the twenty-first century.[311] If greenhouse gas concentrations were to be stabilized, anthropogenic warming and sea level rise would still continue for centuries owing to the timescales associated with climate processes and feedbacks.

B. United Nations Framework Convention on Climate Change and Kyoto Protocol

331. The twelfth meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP-12) and the second Meeting of the Parties to the Kyoto Protocol (CMP-2) focused on long-term action on climate change, including action beyond the first commitment period of the Kyoto Protocol (2008-2012), as well as two new processes initiated in 2005 to determine the future directions of global action on climate change. These sessions coincided with the twenty-fifth meetings of the subsidiary bodies of the Framework Convention. A joint COP and CMP high-level segment was also held, attended by over 100 ministers and other high-level Government officials.

332. Discussions at COP-12 focused on the financial mechanism of the Convention, national communications, development and transfer of technologies, capacity-building, and implementation of provisions relating to the adverse effects of climate change and the specific needs of developing country parties.[312] The Framework Convention Dialogue on Long-Term Cooperative Action on Climate Change considered the Stern Review on the Economics of Climate Change,[313] and discussed two of its four themes, as well as effective and appropriate responses to climate change.

333. CMP-2 was mandated to conduct the first review of the Kyoto Protocol "in the light of the best available scientific information and assessments on climate change

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[309] The likely ranges are 1.1°C-6.4°C. Models of sea level rise do not include the full effects of changes in ice sheet flow.

[310] In some projections, Arctic late-summer sea ice disappears almost entirely by the latter part of the twenty-first century.

[311] Temperatures in the Atlantic region are projected to increase despite such changes owing to the much larger warming associated with projected increases of greenhouse gases.

[312] Report of the Conference of the Parties on its twelfth session, held at Nairobi from 6 to 17 November 2006. FCCC/CP/2006/5 and FCCC/CP/2006/5/Add.1 (advance version).

[313] "Stern Review: The Economics of Climate Change, Executive Summary", available at http://www.sternreview.org.uk. This study estimates that the total cost over the next two centuries of climate change associated with emissions under a business as usual scenario involves impacts and risks equivalent to an average reduction in global per-capita consumption of at least 5 per cent, and could be as high as 20 per cent. Stabilization of greenhouse gases at or below 550 parts per million CO_2 equivalent will require global emission to be 25 per cent below current levels by 2050, and stabilization at 500-550 parts per million CO_2 equivalent will cost on average around 1 per cent of annual global gross domestic product by 2050.

and its impacts, as well as relevant technical, social and economic information".[314] Following the review, CMP-2 concluded that the Protocol has initiated important action and has the potential to make a decisive contribution to addressing climate change, but acknowledged that a number of elements, in particular adaptation, could be further elaborated upon, and implementation further enhanced. The meeting decided that the second review would take place in 2008, based on the best scientific information and assessments, including the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, as well as relevant technical, social and economic information. The first amendment to the Protocol was also adopted, which will allow Belarus to take on emissions reduction commitments, and a proposal of the Russian Federation to develop appropriate procedures for the approval of voluntary commitments was discussed.[315] The second session of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol decided that its work programme for the completion of its mandate will include analysis of mitigation potentials and ranges of emission reduction objectives, analysis of possible means to achieve mitigation objectives, and consideration of further commitments.

C. Developments in other forums

334. The climate change agenda has been taken up in numerous forums, highlighting the urgency of the issue and the need for decisive international action. Participants at the 2007 World Economic Forum chose climate change as the issue that would have the greatest global impact in the coming years, and the one for which the world is least ready.[316] A background paper for the recent Governing Council/Global Ministerial Environment Forum indicates that climate change is the ultimate threat to global security, and lists the key security challenges, including water scarcity and food shortages.[317]

335. On 20 December 2006, the General Assembly adopted a resolution calling on States to work cooperatively towards achieving the objective of the Framework Convention, and strongly urging States to ratify the Kyoto Protocol.[318] Six United Nations agencies and programmes recently launched the "Nairobi Framework", a plan to support developing countries to participate in the Clean Development Mechanism, and UNDP and UNEP are embarking on an initiative to help developing countries factor climate change into national development plans.[319] Work continues on the international ocean carbon coordination project of IOC and the Scientific Committee on Oceanic Research, which aims at developing a global cooperative

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[314] See article 9 of the Kyoto Protocol.

[315] Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its second session, held at Nairobi from 6 to 17 November 2006. FCCC/KP/CMP/2006/10 and FCCC/KP/CMP/2006/10/Add.1 (advance version).

[316] "The Shifting Power Equation: Exploring the Implications", World Economic Forum Annual Meeting 2007, 24-28 January, Davos, Switzerland, available at http://www.weforum.org/en/events/AnnualMeeting2007/index.htm.

[317] UNEP/GC/24/INF/24, "Background paper for the ministerial-level consultations on globalization and the environment", Nairobi, Kenya, 5-9 February 2007.

[318] General Assembly resolution 61/201 on protection of global climate for present and future generations of mankind, adopted by a recorded vote of 137 votes in favour, none against, and 47 abstentions.

[319] Statement of the United Nations Secretary-General to COP-12 and CMP-2, available at http://www.un.org/webcast/unfccc/2006/statements/061115annan_e.pdf.

network of ocean carbon observations, including by compiling field programmes for the Arctic and Antarctic regions related to ocean carbon research observing programmes. IOC will also be implementing a GEF/UNDP project in West Africa on adaptation to coastal and climate change. A similar project is also being developed in the North Indian Ocean region.

336. The G8+5 Climate Change Dialogue was launched in 2006 to bring together senior legislators from the Group of Eight and key emerging economies and other leaders to discuss a post-2012 climate change agreement. The Washington Statement of the Legislators' Forum on Climate Change urges the G8+5 Governments to identify a measurable long-term goal to stabilize greenhouse gas concentrations at a level between 450 and 550 parts per million of CO_2 equivalent, and urges Governments to take action in key policy areas: technology, carbon markets, energy efficiency and adaptation.[320] The Statement also urges the G8+5, at the Group of Eight Summit in Heiligendamm, Germany in 2007, to agree on the key elements of a post-2012 framework, and for global negotiations on such a framework to be launched at the thirteenth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, to be held in Bali, from 3 to 14 December 2007, and concluded by 2009.

XIV. Settlement of disputes

A. International Court of Justice

337. Cases still pending before the International Court of Justice and of relevance to the law of the sea are: *Territorial and Maritime Dispute (Nicaragua v. Colombia)*; *Maritime Delimitation between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras)*; and *Maritime Delimitation in the Black Sea (Romania v. Ukraine)*. The public hearings in the case concerning the *Territorial and Maritime Dispute (Nicaragua v. Colombia)* are scheduled to open on 4 June 2007. The public hearings in the case concerning *Maritime Delimitation between Nicaragua and Honduras in the Caribbean Sea (Nicaragua v. Honduras)* are scheduled to open on 5 March 2007. In the case concerning *Maritime Delimitation in the Black Sea (Romania v. Ukraine)*, the Court has authorized, by an Order dated 30 June 2006, the submission of a Reply by Romania and a Rejoinder by Ukraine and fixed 22 December 2006 and 15 June 2007 as the respective time limits for the filing of these pleadings. Romania's Reply was filed within the time limit thus fixed. These cases may be consulted on the website of the Court (www.icj-cij.org).

B. International Tribunal for the Law of the Sea

338. The case pending before the Tribunal is *Conservation and Sustainable Exploitation of Swordfish Stocks in the South-Eastern Pacific Ocean (Chile/ European Community)*. This case may be consulted on the website of the Tribunal (www.itlos.org).

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[320] Second meeting of the G8+5 Climate Change Dialogue, Washington, D.C., 14-15 February 2007. The Washington Statement is available at http://www.globeinternational.org/ content.php?id=2:8:0:237:0.

C. International arbitration

339. *Guyana/Suriname*. Among pending arbitrations is the dispute concerning the delimitation of maritime boundary between Guyana and Suriname, which is before an arbitral tribunal constituted under annex VII to UNCLOS. Information relevant to this case could be found on the website of the Permanent Court of Arbitration which is acting as registry in this case (http://www.pca-cpa.org/ENGLISH/RPC/#Guyana/Surinam).

D. Court of Justice of the European Communities

340. It is recalled that in 2002, Ireland instituted proceedings against the United Kingdom before an arbitral tribunal provided for under UNCLOS with a view to resolving the dispute concerning the MOX plant, the international transfer of radioactive substances and the protection of the marine environment of the Irish Sea. The applicant criticized the United Kingdom for failure to comply with the Convention by not taking the appropriate measures to protect the marine environment with regard to the operation of the MOX plant. The Commission of the European Communities was informed of the proceedings brought by Ireland and requested that they be suspended on the ground that the dispute in question came within the exclusive jurisdiction of the Court. Ireland did not accede to that request and the Commission accordingly brought the action before the Court of Justice of the European Communities.[321]

341. In its Judgment (Grand Chamber) of 30 May 2006 in Case C-459/03 — *Commission of the European Communities v Ireland* — the Court concluded that, by bringing proceedings under the dispute-settlement procedure laid down in UNCLOS, without having first informed and consulted the competent Community institutions, Ireland had failed to comply with its duty of cooperation under the European Communities and Euratom treaties.[322] The Court accordingly found that Ireland was in breach of Community law.[323]

XV. International cooperation and coordination

342. The importance and contribution of the work of the Consultative Process[324] over the past seven years was recognized by the General Assembly in its resolution 61/222. The Assembly also welcomed the report on the work of the Consultative Process at its seventh meeting (A/61/156), and invited States to consider the agreed consensual elements relating to ecosystem approaches and oceans set out in Part A thereof. The Assembly furthermore requested the Secretary-General to convene the

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[321] See press release No. 45/06 of 30 May 2006 at http://curia.europa.eu/en/actu/communiques/cp06/aff/cp060045en.pdf. See also A/61/63, para. 275.

[322] See "Note on the citation of articles of the Treaties in the publications of the Court of Justice and the Court of First Instance" at http://curia.europa.eu/en/content/juris/noteinfo.htm.

[323] See *Official Journal of the European Union*, C 165/2 of 15 July 2006 at http://curia.eu.int/jurisp/cgi-bin/form.pl?lang=EN&Submit=rechercher&numaff=C-459/03.

[324] The Consultative Process was established by resolution 54/33 to facilitate the annual review of developments in ocean affairs by the General Assembly, and extended for two three-year periods by resolutions 57/141 and 60/30.

eighth meeting of the Consultative Process in New York from 25 to 29 June 2007. That meeting will focus its deliberations on "Marine genetic resources", while the topic for the ninth meeting in 2008, as already agreed upon by the Assembly, will be "Maritime security and safety". Following appropriate consultations with Member States, the President of the General Assembly reappointed Cristián Maquieira (Chile) and Lori Ridgeway (Canada) as co-chairpersons of the eighth meeting.

XVI. Capacity-building activities of the Division for Ocean Affairs and the Law of the Sea

343. General Assembly resolutions show that Member States attach great importance to capacity-building activities of the Division and as such 12 paragraphs were devoted to this subject in resolution 61/222.

344. To respond to requests of States, the Division has increased its capacity-building activities. In addition to those outlined in previous reports (A/61/63 and Add.1), the Division has also embarked on the development and delivery of training courses on MPAs and on developing and implementing an ecosystem approach. Furthermore, the Division has started the training course, at subregional level, to assist States in the preparation of submissions to the Commission on the Limits of the Continental Shelf for the delineation of the outer limits of their continental shelf beyond 200 nautical miles.

345. Also, in response to the growing emphasis on proactive initiatives to better equip States to face the challenges of implementing the Convention and to derive benefits therefrom, the Division continues in addition to the training programmes, to provide advisory services, administer trust funds, organize briefings and prepare special studies.

A. Briefings for General Assembly delegates

346. For the fifth consecutive year, the Division and the United Nations Institute for Training and Research organized a briefing on "Developments in Ocean Affairs and the Law of the Sea" on 2 and 3 October 2006. The purpose of the briefing was to facilitate the negotiations of the draft resolutions related to the item entitled "Oceans and the Law of the Sea" during the sixty-first session of the General Assembly. The briefing was attended by more than 50 participants and received very positive feedback. A sixth annual briefing, which will have a similar focus, is tentatively scheduled to be held in October 2007.

B. Hamilton Shirley Amerasinghe Fellowship Programme

347. Mr. Marvin T. Ngirutang from Palau, recipient of the 2005 twentieth Fellowship award is currently carrying out his research/study programme at the University of Oxford, United Kingdom, under the supervision of Professor Vaughan Lowe, Chichele Professor of International Law and Fellow of All Souls College. His research topic of research/study is on "Legal issues relating to the continental shelf of Palau". He is expected to commence the second phase, which will last for three months, of the Fellowship programme in early April 2007 at the Division.

348. The 2006 awardee of the Fellowship, Mr. Viet Nguyen Hong of Viet Nam is expected to start his programme in the fourth quarter of 2007. Arrangements are under way for his placement at a suitable participating university.

349. Further information, including application files and an up-to-date list of participating universities, are available at www.un.org/depts/los.

C. United Nations-Nippon Foundation of Japan Fellowship Programme

350. Now in its third year of operation, the United Nations-Nippon Foundation Fellowship Programme has awarded 30 Fellowships to Government officials and other mid-level professionals to undertake advanced academic research in the field of ocean affairs and the law of the sea or related disciplines. The second group of Fellows (from Chile, Georgia, Indonesia, Madagascar, Mozambique, Myanmar, Solomon Islands, Sri Lanka, United Republic of Tanzania and Thailand) are undertaking the final phase with the Division. The 10 2007-2008 Fellows (from Antigua and Barbuda, Benin, Brazil, Cambodia, Cameroon, Colombia, Comoros, Indonesia, the Philippines and Thailand) will be commencing the first-phase placements early in 2007.

351. Further information, including the past Fellows' research papers, application files and an up-to-date list of participating universities, are available on the Fellowship's webpage (www.un.org/depts/los/nippon).

D. Training courses

352. *Training course to promote compliance with article 76 of the Convention*. After concluding a first round of four training courses at the regional level (see A/60/63, paras. 47-49; A/60/63/Add.2, paras. 109-112; A/61/63, paras. 48-51; A/61/63/Add.1, paras. 180-181), the Division organized, in collaboration with the Government of Brunei Darussalam and with the cooperation of Grid-Arendal and the Federal Institute for Geosciences and Natural Resources, Germany, its first subregional course in Bandar Seri Begawan, Brunei Darussalam, from 12 to 16 February 2007. The course was successfully completed by 28 technical and administrative staff from Brunei Darussalam, China, Indonesia, Malaysia, the Philippines and Viet Nam.

353. *Training Programme on the Development, Implementation, and Management of Marine Protected Areas*. In response to paragraph 74 of General Assembly resolution 60/30, the Division has developed in cooperation with the International Ocean Institute a regional training course on the "Development, Implementation, and Management of Marine Protected Areas". The training course will provide an in-depth analysis of the legal, technical and scientific aspects of the selection, development, establishment and management of marine protected areas. The first regional delivery was held in Honiara, Solomon Islands, from 15 to 20 January 2007, for small island developing States of the Pacific region. Thirteen Government officials participated in the course from 11 States of the region (Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Palau, Samoa, Solomon Islands, Tonga, Tuvalu

and Vanuatu). Further delivery of this training course for other regions and subregions is being planned.

E. Trust funds

1. Commission on the Limits of the Continental Shelf

354. *Trust fund for the purpose of defraying the cost of participation of the members of the Commission on the Limits of the Continental Shelf from developing States in the meetings of the Commission.* In 2006, New Zealand made a contribution of $30,000 and Ireland contributed $59,905, making a total of $89,905 that was contributed during 2006.[325] According to the provisional accounts, for the period ending 31 December 2006, expenditure for this trust fund in 2006 (including programme support costs) was $70,451 and the fund balance was estimated to be $74,612. The General Assembly, in its resolution 61/222, expressed its concern regarding the resources available in this trust fund and urged States to make contributions to it.

355. *Trust fund for the purpose of facilitating the preparation of submissions to the Commission on the Limits of the Continental Shelf for developing States, in particular the least developed countries and small island developing States, and compliance with article 76 of the United Nations Convention on the Law of the Sea.* Thirteen participants received assistance from this trust fund for the training course held in Brunei Darussalam from 12 to 16 February 2007 (see para. 352 above). A contribution of $1,038,831 was made by Norway and $100,112 was contributed by Ireland, making a total of $1,138,943 which was contributed to this trust fund during 2006.[326] According to the provisional accounts for the period ending 31 December 2006, the expenditure (including programme support costs) was approximately $83,551 and the fund balance was approximately $2,150,640.[327]

2. Voluntary trust fund for the purpose of assisting developing countries, in particular least developed countries, small island developing States and landlocked developing States, in attending meetings of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea

356. The General Assembly decided in its resolution 61/222 that assistance from this trust fund be broadened to include daily subsistence allowance. Concerns had been expressed at the seventh meeting of the Consultative Process that the trust fund was limited to covering the costs of an economy round-trip airfare from the capital of the country of a representative to New York.

357. The decision of the Assembly will result in a substantial increase in the amount of assistance that will be available to each participant from the trust fund.

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[325] In 2006, Ireland pledged €150,000 to this trust fund to be paid in three annual instalments (see A/61/63/Add.1, para. 186).

[326] In 2005, Ireland pledged €120,000 to this trust fund to be paid in three annual instalments (see A/61/63, para. 53).

[327] The members of the panel of experts, which assists the Division in the examination of applications to the trust fund in 2006, were as follows: the Permanent Representatives of Mexico, Norway, Papua New Guinea and Senegal, the Deputy Permanent Representatives of Japan and the Russian Federation; and the Law of the Sea Director, Department of Foreign Affairs of Ireland.

There were no contributions to the trust fund during 2006, however. According to the provisional accounts for the period ending 31 December 2006, the expenditure (including programme support costs) was $68,153 and the fund balance was approximately $72,016. The General Assembly in its resolution 61/222 expressed its concern regarding the insufficient resources available in the trust fund and urged States to make additional contributions.

3. International Tribunal for the Law of the Sea Trust Fund

358. There have been no applications to this trust fund since the application of Guinea-Bissau in 2004. A contribution of $12,724 from Finland was made to this trust fund during 2006. According to the provisional accounts, there was no expenditure in 2006 and as of 31 December 2006, the fund balance was $85,869. It is noted that this is one of the trust funds to which the General Assembly, in its resolution 61/222, urged States to contribute.

XVII. Conclusions

359. It follows clearly from the present report that oceans and seas require increasingly urgent attention. The report also demonstrates, as have the discussions in the Consultative Process, that issues relating to oceans and seas are multidisciplinary, interconnected and becoming more complex. An effective response by the international community will therefore require integrated, coordinated and cooperative approaches.

360. Among the emerging issues of an interdisciplinary nature, the utilization of marine genetic resources presents a particular challenge in light of the scientific, technological, socio-economic, environmental, policy and legal issues that it raises. Further studies are required to comprehend among others the full level of activities related to marine genetic resources, and the nature of partnerships created between the public and private sectors as well as between public institutions from different States.

361. Also as noted in the present report, despite heightened efforts at the global level, coastal and marine ecosystems continue to deteriorate as a result of pressures from human development. Consequently, priority needs to be given to the management of human activities that adversely impact marine ecosystems in order to ensure conservation, sustainable use and development of ocean resources in the interests of current and future generations.